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THE MAGAZINE

OF

NATURAL PHILOSOPHY.

THE

MAGAZINE OF

NATURAL PHILOSOPHY.

WITH SIX COLOURED MAPS AND NUMEROUS ILLUSTRATIONS.

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TO

COLONEL EDWARD SABINE, R.A.,

TREASURER AND VICE-PRESIDENT OF THE ROYAL SOCIETY;

F.R.A.S.; HON. MEM. CAM. PHIL. SOC.; ACADD. IMP. SC. PETROP., BRUX., NORV.,

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MEM. NATIONAL INST. WASHINGTON, U.S., ET GEOGR. PARIS CORRESP.; MEM. OF

ROYAL BATAVIAN SOC., ETC.,

THIS SMALL VOLUME

OF SCIENTIFIC FACTS

IS DEDICATED, AS A SLIGHT ACKNOWLEDGMENT OF THE RESPECT AND ESTEEM

OF THE AUTHOR

FOR THE VALUABLE AID WHICH THIS PHILOSOPHER HAS RENDERED TO SCIENCE

BY HIS

DILIGENT LABOURS FOR THE BENEFIT OF MANKIND.

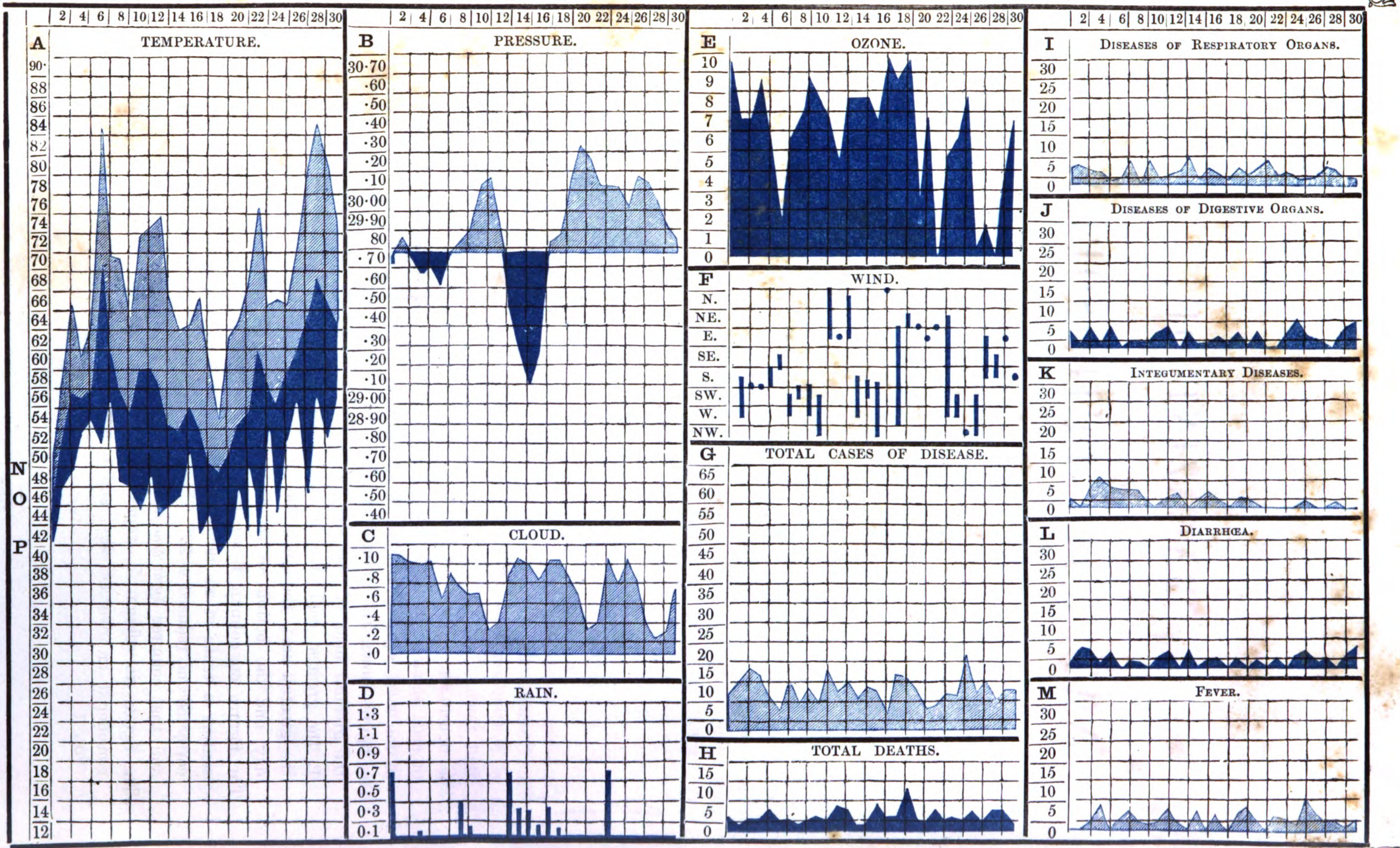
CONTENTS.

PAGE.
Introduction 1
The New Planets 3, 110
Singular Mortality amongst the Swallow Tribe. By the Editor . 5
The Wonders of the Atmosphere: a Popular Treatise on Meteorology. By E. J. Lowe, Esq. 14, 30, 58, 80, 104, 127
On the Hurricanes of the South Pacific Ocean, (with Engravings,) By Thomas Dobson, Esq., B.A. 53, 77, 101
The Natural History of Nottinghamshire 84
Researches on the Relation of Climate to Disease. By Tindal Robertson, Esq. M.D. 125
The Comets 25
Observations on the Planet Euphrosyne, at the Hamburgh Observatory By M. C. Rümker, and M. G. Rümker 87
Atmospheric Electricity 29
Snow Crystals, (with Engravings.) By the Editor . . . 34, 61, 133
The Chemical and Physiological Balance of Organic Nature. By M. J. Dumas, and M. J. B. Boussingault 106
On the Extreme Minuteness of Bodies 107
Observations on Atmospheric Electricity. By the late H. Lawson, Esq. 108
Mineral Substances in Plants 111
Climate, Weather, and Disease. By Alfred Haviland, Esq. . . 132
Curious Springs and Wells 88, 135
On the present condition of the Craig Telescope, at Wandsworth . 89
Meteors, or Falling Stars, (with Engravings.) By the Editor . 64, 133
Meteor seen at the Observatory, Beeston, on the 13th. of June, 1855 28
Large Meteor seen on the 3rd. of August, 1855, at Beeston . . 37
Remarkable Circles of Light surrounding the Sun, and Mock Suns, seen at the Beeston Observatory, April 24th., 1854, (with Engraving) 39
Splendid Lunar Coronæ and Halo seen at the Beeston Observatory, October 25th., 1855, (with Engraving) 143
Occultations of Stars by the Moon, in December, 1855 110
The Earthquakes between 1852 and 1855 . . . . 65, 136
Tree at Lenton, struck by Lightning, May 28th., 1854, (with Engraving) 63
The Gale of the 25th. and 26th. of October, 1855, at the Beeston Observatory 117

PAGE.
History of the Thunder-storms which have occurred at the Highfield House Observatory, from January, 1841, to January, 1856. By the Editor 111, 138
Thermometrical Observations, made by the late Matthew Needham, Esq., at Lenton Grove, (a distance of 200 yards N.W. of the Highfield House Observatory) 114, 129
Effect of Temperature on the Wheat Crop 136
Violent Earthquake in Switzerland 41
On a Self-registering Wet-bulb Thermometer 10
The Beeston Observatory 11
Calendar of Nature at the Highfield House Observatory, near Nottingham. By the Editor 7, 38, 61, 88, 110, 143
State of the Weather at Highfield House Observatory 16, 35, 67, 89, 123, 147
Result of Observations made at the Beeston Observatory . . 40, 69
Result of Observations made at the Highfield House Observatory 123, 147
Amount of Rain fallen at Highfield House during the past twelve years 15, 40, 70, 91, 118
Fall of Rain in 1855 . . . . 41, 92, 118, 144
Amount of Rain fallen in various localities, during the months of April, May, and June, 1855, from the Registrar General's Observers 75
Rain-fall in Great Britain for the Quarter ending September 30th., 1855 119
Direction of the Wind as written by the Atmospheric Recorder, at the Beeston Observatory, in 1855 . . 19, 42, 70, 93, 119, 144
Force of the Wind, as marked by the Atmospheric Recorder, at the Beeston Observatory, in 1855 . . . 21, 44, 72, 94, 121, 145
Electricity at the Beeston Observatory in 1855 . 23, 46, 74, 96, 122, 146
Papers read at the Royal Society 8
Anniversary Meeting of the Royal Society 9
Zoological Society of London 48
Royal Astronomical Society 48, 122
Geological Society 50
British Association for the Advancement of Science 96
British Meteorological Society 98
Government and Science. 99
Scottish Meteorological Society 122
Meteorological Tables, from Observations recorded at the Highfield House Observatory, near Nottingham . . 24, 52, 76, 100, 124, 148

Errata.—Page 147, Mean of the greatest heat and greatest cold of each day, corrected for diurnal range, for "41 1°," read "40.7°." Page 148, For "Meteorological Table for October 1855," read "November 1855."

JUNE, 1855.


2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
A TEMPERATURE.
90· 88 86 84 82 80 78 76 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12
N
O
P
B PRESSURE.
30·70 ·60 ·50 ·40 ·30 ·20 ·10 30·00 29·90 80 ·70 ·60 ·50 ·40 ·30 ·20 ·10 29·00 28·90 ·80 ·70 ·60 ·50 ·40
C CLOUD.
·10 ·8 ·6 ·4 ·2 ·0
D RAIN.
1·3 1·1 0·9 0·7 0·5 0·3 0·1
E OZONE.
10 9 8 7 6 5 4 3 2 1 0
F WIND.
N. NE. E. SE. S. SW. W. NW.
G TOTAL CASES OF DISEASE.
65 60 55 50 45 40 35 30 25 20 15 10 5 0
H TOTAL DEATHS.
15 10 5 0
I DISEASES OF RESPIRATORY ORGANS.
30 25 20 15 10 5 0
J DISEASES OF DIGESTIVE ORGANS.
30 25 20 15 10 5 0
K INTEGUMENTARY DISEASES.
30 25 20 15 10 5 0
L DIARRHŒA.
30 25 20 15 10 5 0
M FEVER.
30 25 20 15 10 5 0

MAGAZINE OF

NATURAL PHILOSOPHY.

INTRODUCTION.

It will be unnecessary to say many introductory words with respect to the "Magazine of Natural Philosophy." The work is intended to be a popular account of everything *new* that takes place in science, no matter in what branch of Philosophy. The leading feature of the magazine will be the state of the weather, and its effects upon the diseases of man, animals, and plants. In the present number there is no article upon disease, because the month of June has been exceedingly healthy; it would, therefore be needless to occupy the pages of the magazine with information which can be seen at once by referring to the map.

DESCRIPTION OF THE MAP.—JUNE, 1855.

The state of the weather is from the Highfield House Observatory.

The Diseases and Deaths are from statistics communicated by Dr. Robertson, of Nottingham, and have all occurred in the immediate neighbourhood of that town.

The figures on the top of the page are the days of the month. The centre of each square represents one day, and midway between this and the centre of the next square, that is, on the line, the following day.

The figures down the column A, are degrees of temperature. N, represents the greatest heat of each day; O, the mean temperature of each day; and P, the greatest cold of each night: (the top of the *light blue* line shewing the greatest heat, the top of the *dark blue* line the mean temperature of each day, and the bottom of the *dark blue* line the greatest cold of each night.)

The figures on column B are inches of mercury pressure, each square representing a tenth of an inch. It gives the mean height of the barometer, corrected and reduced to 32°. That part coloured *dark blue* is below the mean, and that coloured *light blue* above the mean of the past seven years for June.

The figures in column C, represent the mean amount of cloud; 10 being considered an overcast sky, and 0 perfectly free from cloud.

The figures in column D represent the amount of rain, from the centre of one square to the centre of the next being three-tenths of an inch.

The figures in column E represent the amount of ozone; 10 being the greatest amount, and 0 no ozone.

The letters in column F shew the direction and movement of the wind.

The figures in columns G to M, are the number of cases of disease or death, each additional square representing five additional cases.

It should be understood that the diseases are those which have been actually ascertained to COMMENCE on a certain day. They are registered by Dr. Robertson, from the weekly observations of several medical men in Nottingham; and may be taken to represent fairly the beginning and progress of epidemic, and other diseases supposed to be influenced by the changes in the weather, etc., which occur from time to time in that town. The deaths are obtained by him from the registrar's, and will shew from month to month the comparative mortality from all causes occurring in a population of over sixty thousand. The letter G indicates "Diseases occurring from every source." H, the total number of deaths; I includes Diseases of the Respiratory and Circulatory Organs—Asthma, Catarrh, Bronchitis, Pleurisy, Carditis, Inflammation of the Lungs, Influenza, Hooping Cough, Croup, etc. J includes Inflammation of the Bowels, Dyspepsia, Diarrhœa, Dysentery, Cholera, Diseases of the Liver, and other abdominal viscera. In K are placed the Eruptive Fevers, namely Scarlet Fever, Measles, Small Pox, and other cutaneous diseases, whether local or general.

Diarrhœa and Fevers are given separately, as being more prevalent at this season than other disorders; but as the necessity occurs, other diseases, such as Cholera and Influenza, which may be widely spread amongst the people, will be specially noticed, and have their separate places upon the map.

There will also be appended, quarterly, a brief sketch of the prevalent diseases amongst human beings, animals, and plants, with observations upon the effect exercised upon them by temperature, hygienic measures, and other ascertainable causes.

THE NEW PLANETS.

Astronomical discovery has made rapid progress, as regards the addition of New Planets during the past ten years. It will be remembered that previous to 1845 there were but eleven Planets—Mercury, Venus, The Earth, Mars, Vesta, Ceres, Juno, Pallas, Jupiter, Saturn, and Uranus. Before the discovery of the four Planets between Mars and Jupiter, which took place within the years 1801 and 1807, a gap occurred in the Solar system, which led to the belief that a Planet might be found at a certain mean distance from the sun, and in 1801 the gap was removed by the discovery of a small Planet; and very many months had not elapsed before astronomers were still more astonished at the discovery of a second Planet, at very nearly the same distance from our sun; and, within about seven years, two more had been added to this group; after which, all efforts at discovery, for nearly forty years, failed to add another to this cluster; nevertheless, Astronomers did not despair of detecting one or two others, and the search was continued, and not only have these labours been rewarded beyond expectation, but a Planet, situated more remotely than any other from our sun, has been discovered, increasing the bounds of our Solar system very greatly. The long cessation in Planetary discovery ended by the detection, on the 8th. of December, 1845, of *Astræa*, by M. Hencke, of Driesen; on the 1st. of July, 1847, the same Astronomer discovered *Hebe*. In 1847, two other Planets were added to the number by Mr. Hind, of Mr. Bishop's Observatory, London—*Iris*, on the 13th. of August, and *Flora* on the 18th. of October. In 1848, Mr. Graham, the assistant of Mr. Cooper, of the Markree Observatory, Ireland, added, on the 25th. of April, the Planet *Metis*. In 1849, Signor de Gasperis, at Naples, discovered on the 12th. of April, *Hygeia*. In 1850, three others were added, the first, *Parthenope*, on the 11th. of May, by Signor de Gasperis; the second, *Victoria*, by Mr. Hind, on the 13th. of September; and the third, *Egeria*, by De Gasperis, on the 2nd. of November.

In 1851, two others were detected—*Irene*, by Mr. Hind, on the 19th. of May, and independently four days later by De Gasperis, and *Eunomia*, by De Gasperis, on the 29th. of July. In 1852, the extraordinary addition of eight Planets were added to the list of those already discovered, the first—*Psyche*, by De Gasperis, on the 17th. of March; the second—*Thetis*, by M. Luther, of the Bilk Observatory, in Prussia, on the 17th. of May; the third and fourth by Mr. Hind—*Melpomene*, on the 24th. of June, and *Fortuna*, on the 22nd. of August; the fifth—*Massillia*, was discovered by De Gasperis, on the 19th. of September; and independently, on the 20th., at Marseilles, by M. Chacornac; the sixth—*Lutetia*, at Paris, on the 15th. of November, by M. Goldschmidt; the seventh and eighth by Mr. Hind—*Calliope* on the 16th. of November, and *Thalia* on the 15th. of December. In 1853 the number was increased by four others, the first—*Themis*, by De Gasperis, on the 5th. of April; the next—*Phocea*, by M. Chacornac, on the 6th. of April; the third—*Proserpine*, on the 5th. of May, by M. Luther; the fourth—*Euterpe* by Mr. Hind, on the 8th. of November. In 1854, six additional small Planets were detected—*Bellona*, by M. Luther, on the 1st. of March; *Amphitrite*, on the 1st. of March, by M. Marth, one of Mr. Bishop's assistants; independently by Mr. N. Pogson, on the 2nd. of March, at the Oxford Observatory; and independently on the 3rd., at Paris, by M. Chacornac; *Urania*, on the 22nd. of July, by Mr. Hind; *Euphrosyne*, on the 1st. of September, at the Washington Observatory, U. S., by Mr. Ferguson; *Pomona*, at Paris, on the 26th. of October, by M. Goldschmidt, and *Polyhymnia*, at Paris, on 28th. of October, by M. Chacornac. In 1855, up to the present date, two have been detected, the first—*Circe*, on the 6th. of April, by M. Chacornac; and the other—*Leucothea*, by M. Luther, on the 19th of April.

We have thus a collection of thirty-five small Planets in the place of one. In order to make the subject clear, the following are the distances of the various Planets with respect to the sun:—

Mercury,	37	millions of	miles.	Jupiter,	496	millions of	miles.
Venus,	69	”	”	Saturn,	909	”	”
The Earth,	95	”	”	Uranus,	1828	”	”
Mars,	145	”	”	Neptune,	2862	”	”
The Asteroids,	210 to 300,		”				

The distance between Mars and Jupiter is 351 millions of miles, and at somewhat less than 250 millions of miles from the sun, and about 103 millions from either Mars or Jupiter, and in the case of Flora, approaching within 65 millions of miles from Mars, and Euphrosyne within 196 millions from Jupiter, this curious ring of Planets circulate round the sun. We know of no other similar creation, as a cluster of Planets, and whether they were originally one, burst by some internal explosion, or whether, as a ring of Planets, they were originally created, our finite minds cannot explain; that they all work in great harmony, with respect to each other, is quite evident, for they cross each other's orbits many times in one complete revolution round the sun.

Mr. Bishop has published a very convenient account of the minor Planets, from which we gather many interesting details. These great additions to Planetary discovery, are, for the most part, the result of carefully mapping down the small stars in the neighbourhood of the Equator, and afterwards returning over the same ground by comparing the maps with the heavens. It must occur to every one that not only must the stars be increased in number by the presence of a new Planet, but they may become less in number by a Planet having moved away from the chart in which it might previously have been mapped *as a star*. Thus several Planets have been lost owing to not having been detected at the time, or from a continuance of unfavourable weather.

In casting a glance at the various discoveries of the *Asteroids*, or small Planets, our countryman, Mr. Hind, takes the lead, having detected no less than ten planets, M. de Gasperis has added seven, M. Luther four, M. Chacornac, three, Herr Goldschmidt, M. Hencke, and Dr. Olbers, two each, M. Piazzi, M. Harding, Mr. Graham, M. Marth, and Mr. Ferguson, one each.

In conclusion, the discovery of the Planet Neptune is the most glorious triumph ever achieved. By carefully marking the positions of the different Planets, it is at once seen that each is influenced by the rest, that instead of moving in a regular curve, each one will move outwardly, if there happen to be a planet exterior, in a position to influence it; or inwardly, if the planet be interior to it. The Planet Uranus, the farthest from the sun, previous to the autumn of 1846, had been noticed by various Astronomers to have received attraction from an *outward* body, consequently, M. Le Verrier, on the continent, and Mr. Adams, in England, commenced calculations, from which they pointed out in what position in the heavens a new Planet was to be found. M. Le Verrier wrote to Dr. Galle to commence a search for this new body, and it luckily happened that Dr. Bremicker had completed a chart of the heavens in the very position where M. Le Verrier stated the Planet could be found, and on the very evening on which the letter arrived the stranger was detected, and thus, although both M. Le Verrier and Mr. Adams are each deserving of equal praise for their independent glorious labours, still the former, from the circumstance of the discovery by Dr. Galle, must necessarily take precedence in the discovery of the Planet Neptune. The distance of Neptune from the sun is 2862 millions of miles, and its revolution round that luminary occupies no less than 164 years and a half.

We have thus briefly given an account of the new Planets, and doubtless before many months have passed by, the subject will again be referred to in connection with other fresh additions to our Planetary worlds.

SINGULAR MORTALITY AMONGST THE SWALLOW TRIBE.

BY THE EDITOR.

There has seldom been recorded a more singular circumstance than the mortality amongst the Swallow tribe, which occurred on the 30th. and 31st. of May in the present year.

The unusually cold weather for this advanced season, appears to have operated in producing the destruction of the greater number of this useful tribe of migratory birds. The severity of the weather causing a scarcity of insects, the ordinary food of the Swallow, and rendering the birds too weak to enable them to search for food.

On the 30th. of May, the Swallows became so tame that they flew about the legs of persons, and could be caught without difficulty; and on the following morning, most of them lay dead upon the ground, or in their own nests.

In this neighbourhood, (near Nottingham,) the greatest mortality was occasioned amongst the House Swallow, (*Hirundo rustica,*) yet solely because this bird predominates.

Near the Red-hill Tunnel, at Thrumpton, there are great numbers of Sand Martins, (*Hirundo riparia,*) and there in a saw-pit on the banks of the River Soar, hundreds congregated and died.

At Borrowash, near the Derwent river, there are very many White Martins, *(Hirundo urbica;)* they also congregated and died, lying ten or twelve deep on the window-sills. Several persons opened their windows, and the birds were very willing to take shelter in the rooms, exhibiting no disposition to depart. Many were kept alive in the different houses by being fed with the *Aphis* of the rose tree, the only procurable insect.

At Bullwell, Wollaton, Long Eaton, Sawley, and many other places, the same fearful mortality occurred. Farmers opened their barn-doors to admit the birds. To shew the extent of the deaths it may be mentioned that at one place, where previously there were fifty nests occupied, only six pair survived to take possession of them.

The manner in which they congregated was a curious feature in the occurrence. A Swallow would fly round a heap of dead or dying companions, and then suddenly dart down and bury itself amongst them.

On the same days, in the vale of Belvoir, and in parts of Nottinghamshire and Lincolnshire, several hundred newly-shorn sheep perished.

A brief account of the weather at Highfield, previous to the 31st. of May, will prove interesting:—

MAY.	Maximum temperature in shade.	Minimum temperature	Mean temperature.	Greatest cold on Grass.	Range of temperature.	Direction of Wind.
26	81.9	54.4	65.1	45.0	27.5	E.
27	70.0	51.6	56.8	47.5	18.4	E.
28	61.8	43.0	49.3	40.2	18.8	E.
29	56.1	38.8	44.8	36.0	17.3	N.
30	50.0	35.0	40.4	30 5	15.0	N.
31	44.7	37.8	42.0	37.2	6.9	NE.

During these six days the barometer ranged between 29.6 inches and 29.9 inches. The first three days were very fine, and during the whole time there was much ozone. 29th., electricity active from 11 A. M. till noon. 30th., boisterous wind with hailstorms. 31st., boisterous wind with continued rain. On the 30th. there was a frost.

It would be interesting to trace over what extent of the island this mortality was noticed.

CALENDAR OF NATURE FOR JUNE, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

BY THE EDITOR.

June 2nd.—The Lilac, *(Syringa vulgaris,)* in flower. During the past eleven years the period of flowering has invariably occurred in May, the dates being, 1854, 5th.; 1853, 19th.; 1852, 15th.; 1851, 15th.; 1850, 19th.; 1849, 22nd.; 1848, 16th.; 1847, 22nd.; 1846, 12th.; 1845, 17th.; and 1844, 4th. The mean date is the 16th. of May, and the range of days in the different years being eighteen, thus this year it was later by seventeen days than usual, and eleven days later than any year since 1844.

4th.—Laburnum, (*Cytisus laburnum,*) in flower. In 1852, the date was May 15th.; 1851, 25th.; 1850, 19th.; 1849, 30th.; 1848, 16th.; 1847, 26th.; 1846, 12th.; 1845, June 1st.; and 1844, May 14th. The mean period May 21st., and the range of flowering twenty days. In 1855, it was fourteen days later than usual, being three days later than had been before recorded here.

4th.—Hawthorn, (*Cratægus oxycantha,*) in flower. In 1854 it was in bloom on the 29th. of April; in 1852, May 15th.; 1851, 21st.; 1850, 21st.; 1849, 22nd.; 1848, 14th.; 1847, 28th.; 1845, 25th.; and 1844, 14th. The mean time being May 18th., and the range twenty-nine days. This year it was seventeen days later than usual, and thirty-six days later than in 1854.

4th.—Snowball Tree, *(Vibernum opulus,)* in flower. In 1854, on June 7th.; 1852, 14th.; 1851, 10th.; 1850, 2nd.; 1848, May 27th.; 1847, 25th.; and 1844, 29th. Mean time, June 3rd.; range, twenty days. This year one day later than usual.

4th.—The Cockchaffer, (*Melolontha vulgaris,*) arrived. In 1853, it arrived on June 1st.; in 1852, 5th.; 1851, May 23rd.; 1850, 31st.; 1848, 10th.; 1845, 30th.; and in 1844, 30th. Mean time, May 27th.; range in days, twenty-six, This year eight days later than usual.

4th.—Blue Iris in bloom. In 1854, it was in flower on the 19th. of May.

4th.—Tulips in flower. In 1854, they were in flower on the 8th. of May, and in 1852, on the 20th. of May.

4th.—*Cheiranthus alpinus* and *Cheiranthus Marshallii* in flower.

10th.—*Convallaria verticillata* and Woodruff, *(Asperula odorata,)* in flower.

10th.—Hawthorn, Laburnum, Lilac, Flowering Ash, (*Ornus Europæa,*) Scarlet Thorn, Tree Peony, (*Pæonia moutan,)* Mountain Ash, (*Pyrus aucuparia,)* Service Tree, (*Pyrus sorbus,*) and *Saponaria ochymoides* in full glory of bloom.

12th.—*Weigelia rosea* in flower.

12th.—Rhododendrons and Rock Rose, (*Helianthemum vulgare,*) in full flower.

19th—Very many Brackenclocks, (*Melolontha horticola,)* arrived.

23rd.—Wheat—some few in ear at Wilford.
23rd.—*Weigelia rosea* in full flower.
26th.—Wild Snowball Tree in flower.
26th.—Milk-wort, (*Polygala vulgaris,*) in full flower.
27th.—Many Lady-birds, (*Coccinellæ.*)
27th.—Very many Brackenclocks.
28th.—*Dictamnus fraxinella* in flower.
28th.—*Dictamnus albus* in flower.
28th.—Rose, (Mrs. Bosanquet and Proserpine,) in flower.
30th.—Wild Rose, (*Rosa canina,*) in flower.
30th.—Bryony, (*Bryonia dioica,*) in flower.
30th.—Wheat in ear.

Thus it will be seen that the Lilac, whose average date for blooming is May 16th., was, in 1855, seventeen days later than usual; the Hawthorn, whose average date is May 18th., was also seventeen days later than usual; the Laburnum, whose mean date is May 21st., was fourteen days later; the Cockchaffer, whose mean date is May 27th., was eight days later than usual; and the Snowball Tree, whose mean date is June 3rd., was only one day later than the average.

PAPERS READ AT THE ROYAL SOCIETY.

In No. 9, vol. vii, of "Proceedings of the Royal Society," is an interesting paper by the Astronomer Royal, "On the Computation of the Effect of the Attraction of Mountain masses, as disturbing the apparent Astronomical latitude of stations in Geodetic Surveys." The author was induced to forward this paper from the circumstance that the computed attraction of the elevated country N. E. of India, considerably exceeded the disturbance which it was sought to explain.

The author accounts for this from the supposition that the interior of the earth is a dense fluid, or semi-fluid, and that the exterior crust floats upon it. This crust cannot at any part be very high upwards as in mountains, at all events, not to any great horizontal extent, unless there is a corresponding downward projection into the fluid-earth; with a crust 100 miles thick, it is shown by calculation that a tendency to crack and sink in table-land will occur in the middle, beyond the resistance of the cohesion of the rocks. Mr. Airy illustrates this by the example of a raft of timber floating on water, if one piece projects higher into the air than another, we know that it extends deeper into the water. Therefore the horizontal attraction of a mountain mass on a point at a considerable distance is scarcely felt. For the increase of attraction of that which is above the general level is almost rendered neutral by the deficiency of attraction below it, where the lighter crust displaces the heavier lava. However, the horizontal attraction on a near point on the earth's surface will not vanish because the mountain which produces the positive attraction is nearer than the lava-displacement which causes the negative attraction. Nevertheless, the attraction will be less than that computed by considering the dimensions of the mountain only.

On the 22nd. of March, 1855, two interesting papers were read, by J. D. Macdonald, Esq., R. N., the first on "The Anatomy of Macgillivraya Cheletropis," and the second on "The Anatomy of Nautilus umbilicatus, and Nautilus Pompilius," and a third paper by J. Mitchell, Esq., Quarter Master of Artillery, Bangalore, "On the Influence of Local Altitude on the Burning of the Fuses of Shells." In the present military age this paper presents some interesting facts; from it we learn that the higher the elevation above the sea level, the longer time do the fuses of shells occupy in burning. This appears owing to the rarity of the atmospheric air. The fuses used in these experiments, were all of the same length, namely, three inches, and the result was as follows:—

At the Artillery Depôt-yard, on St. Thomas' Mount—Barometer 29.78 inches; temperature, 89°; mean length of time of burning, 14.25 seconds.

At Bangalore, (3000 feet,)—Barometer, 26.89 inches; temperature, 82°; mean length of time of burning, 15.78 seconds.

At Kotagherry, Neilgherries, (6500 feet,) Barometer, 24.02 inches; temperature, 62.7°; mean length of time of burning, 17.10 seconds.

At Cotacamund, Neilgherries, (7300 feet,) Barometer, 23.03 inches; temperature, 54.2°; mean length of time of burning, 18.12 seconds.

Thus causing a difference in the time of burning of four seconds, in an altitude differing by 7300 feet.

ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

From the report of the Annual Meeting, we learn that thirty-two deaths have occurred in the Fellows of this Society during the past year; amongst these may be mentioned, the Arctic Explorers—Sir John Franklin, and Captain Crozier, whose lamentable fate has so long occupied the public mind; Dr. Golding Bird, a well-known London Physician; Lord Denman; Edward Forbes, Esq., one of our greatest Naturalists; Robert Jameson, Esq., a Mineralogist; George Newport, Esq., a diligent Entomologist; and Dr. Wallich, a celebrated Botanist.

On the Foreign List are recorded the demise of the following eminent individuals—Baron Von Lindenau, Macédonie Melloni, and Charles François Brisseau Mirbel.

The Copley Medal was awarded to Professor Müller, of Berlin, for his important contributions to different branches of Physiology, and Comparative Anatomy, and particularly for his researches on "The Embryology and Structure of the Echinodermata."

The next medal was awarded to Dr. Hooker, for his successful labours in Botany.

The Royal Medal was given to Dr. Hoffman, for his "Memoirs on the molecular constitution of the Organic Bases."

The Rumford Medal, to Dr. Neil Arnott, for his Smoke-consuming, and Fuel-saving Fire-place.

The total number of Fellows of the Royal Society, on the 1st. of December, 1853, was seven hundred and sixty-one, and on the 30th. of November, 1854, seven hundred and forty-five. The Society is thus decreasing in the number of its Fellows, and this is owing to only fifteen new ones being elected each year, whilst the mortality is about equal to double this number.

ON A SELF-REGISTERING WET-BULB THERMOMETER.

The ordinary Wet-Bulb Thermometer, known as Mason's Hygrometer, is very simple in its construction. An accurately-marked Thermometer has its bulb enclosed in a muslin or thin silk bag, to which is attached a piece of *cotton-wick*, having the lower end plunged in a cistern of water. By capillary attraction the moisture is conveyed from the cistern to the bulb of the Thermometer, cooling it down below the temperature of the air, more or less according as the air is more or less dry. The Self-registering Wet-Bulb Thermometer differs only from this in the adoption of *self-registering* maximum and minimum Thermometers, in the place of ordinary Thermometers. In this construction the greatest heat and greatest cold of the wet bulb are registered; an important addition to Meteorological investigation.

It must be borne in mind that the maximum or minimum temperature of the air does not always occur at the same time as the maximum and minimum of the Wet-Bulb Thermometer; therefore it cannot be said to record the *actual* degree of greatest dryness, nor the difference between the temperature of the moisture *at the time of greatest heat or cold;* nevertheless the registration of the greatest heat and cold of the *Wet-Bulb* Thermometer is sufficiently important to render this instrument essential in a Meteorological Observatory.

The following are a few examples of the greatest heat of the air, and the greatest heat of the moisture of the air.

Date.	Maximum heat of dry bulb.	Maximum heat of wet bulb.	Date.	Maximum heat of dry bulb.	Maximum heat of wet bulb.
June 21	64.8	53.8	June 27	77.0	63.2
" 22	69.7	57 2	" 28	79.1	67.8
" 23	62.5	58.1	" 29	79.7	66.5
" 24	60.7	58.5	" 30	77.5	66.5
" 25	63.4	57.8	July 1	77.7	63.9
" 26	63.8	59.3	" 2	74.3	66.5

Messrs. Negretti and Zambra, Opticians, Hatton Garden, are now constructing these instruments; they have furnished the Beeston Observatory with two pair, and I can speak with confidence as to their excellence.

THE BEESTON OBSERVATORY.

The Observatory at Beeston is a Meteorological Station, and so completely furnished with instruments for this particular class of observations, that Meteorology cannot fail to be advanced by the printing of the records. For the much greater part, this Observatory owes its excellence to the munificence of Mr. Lawson, who added to the instruments the Atmospheric Recorder, the Electrical Apparatus, Transit Instrument, and indeed, very many other portions of the furniture essential to a good Observatory. The 'Atmospheric Recorder' is a Meteorological Observatory in itself, and so perfectly arranged, that every change which occurs in the atmosphere is written down, at the precise moment of occurrence. To describe this instrument popularly without drawings of all parts, is a difficult matter, let it suffice, therefore, to shew its action in as brief a manner as the subject will admit of.

A sheet of drawing paper, (of exactly twenty-four inches wide, and of any length from thirty to one hundred and ten feet,) is coiled up, on a cylinder, at the N. base of the Recorder Table; this paper passes between two other cylinders, so as to enable it to travel horizontally upon the table, and it is finally fastened to another cylinder at the S. end. By means of a wheel attached to one of the cylinders, the paper is carried forwards at the rate of half an inch an hour, and is at the same rate wound up on the cylinder at the S. end; this latter cylinder having weights attached to enable it to perform this operation, after the registrations have been made. An exceedingly good dead-beat clock drives the paper. This clock was made by the late Dr. Narne, F. R. S.; and apart from its excellence, a scientific interest is attached, from the circumstance that it was the first Transit-clock used in the Cambridge Observatory. It has a good compensation pendulum, hung from an oak support, behind, and independent of the frame of the clock. A maintaining weight of sixteen pounds works the clock, and another of the same weight, the barrel that drives the paper-wheel. These weights are wound up to pulleys attached to a strong beam in the roof of the building to pass down behind the clock-case. Every hour is marked by a pencil on each side of the paper. All the registration and zero pencils are arranged in a straight line across the centre of the table. The first draws the zero-line for the rain, from which the rain-pencil starts; as long as no rain occurs, this latter pencil will draw a line parallel to the zero-line; but when rain falls, which is caught in a Pluviameter, at the top of the recorder-building, it is conveyed into a cistern upon which is a float, carrying a perpendicular piece of brass, toothed at the upper part in inclined planes, up to which rests a horizontal arm, whose work is to push a second arm carrying an even-pointed pencil; this pencil departs from the zero-line according to the amount of rain fallen, until half an inch has been recorded, then it runs back again immediately to the zero-line, and commences another half inch.

It may perhaps be as well to state, that all the zero-pencils are drawing *red* lines, whilst the registrations are *black* lines. The next zero-line is that for evaporation. The Evaporator is at the top of the building, and is ingeniously contrived. It appeared desirable to record this also by means of a float, yet a difficulty was to be overcome; if a float were placed upon the water, evaporation would, in a great measure, be prevented; and to overcome this, two Evaporators were constructed, of exactly the same size, connected together by a lead pipe, the one closed up and having a float upon it, the other open for evaporation: this float has a somewhat similar collection of arms connected with it as those of the rain-gauge, and records upon the paper in a similar manner. In windy weather a tremulous line is recorded, owing to the waves produced upon the surface-water of the Evaporator; yet this is of unfrequent occurrence, and of but little consequence.

The third zero-pencil is drawing the freezing point of Fahrenheit's Thermometer. To make the Thermometer record itself was a difficult task, yet one which has been most ingeniously overcome. There are ten Thermometers (all made alike,) and of which one-half of the length of the tube of each is at right-angles to the other half; these are placed upon a balance, to which is attached a long lever carrying a tube, within which is contained a steel pricker attached to a light spring. If the Thermometers alter in temperature in the slightest degree, a certain amount of mercury is removed out of the one leg of the Thermometer, and carried into the other: this moves the balance, and consequently, the arm which carries the recording steel pricker. Every fifteen minutes a hammer is suddenly dropped by the clock upon this pricker, and the point is driven into the paper, and thus the temperature is recorded.

The next three zero-pencils belong to the direction of the wind; one is drawing a west, another an east, and the third a north or south wind, according as the direction-pencil marks a curve pointing towards the north or the south

The Wind-vane is seventeen and a half feet above the level of the table, and is fastened to a strong copper tube, at the base of which is attached a pencil, and this pencil records the direction of every gust of wind. To this Wind-vane is also attached a force-board, connected with a rod which passes down the centre of this copper tube, and which is attached near the base to an exterior brass tube carrying a cradle, (counterpoised to do away with weight,) at one end of which are attached various weights, from half an ounce up to thirty pounds, and near the centre an arm carrying a pencil: this pencil records the force of every gust of wind.

Two zero-pencils are in connection with the Hygrometer, the one drawing the zero-line of perfectly *dry* air, and the other, air completely *saturated* with moisture; these two points are found by baking and subsequently boiling a piece of cross-grained mahogany, and marking off the difference in its length. This instrument, known as Dr. Franklin's Hygrometer, is placed outside the building, on the north side, near the Thermometers; the Hygrometer carries an arm and a steel pricker, a puncture being made in the paper every fifteen minutes.

The next zero-pencil is that for electricity. A large horizontal wheel of copper wire, six feet in diameter, is supported on a post outside the building, and insulated from the ground; a single wire passes from this wheel through an insulated tube into the building, and then attached to an insulated arm carrying two brass discs, in the centre of which is a third disc in communication with the earth, by means of a wire carried to the lightning conductor: between these discs, suspended by a silked thread, are two others insulated and placed upon an arm, to the extremity of which a pencil is attached. When any electricity is collected upon the wire of the wheel, the two latter discs are attracted to those in communication with the wheel, and are then repelled to that in connection with the lightning conductor, and this movement cannot take place without recording with the pencil, thus the moment of occurrence is accurately marked upon the paper. The last record is that of the Barometer: there are two zero-pencils, the one drawing a pressure of twenty-eight inches, and the other that of thirty-one inches. The Barometer itself is of peculiar construction, the cistern and tube being of the same diameter, so that any rise of mercury in the one will experience a similar fall in the other. A float is placed upon the cistern Mercury, connected by a thin gold chain with a semi-wheel, to the upper end of which a long arm is attached carrying a steel pricker: every fifteen minutes a hammer from the clock strikes the pricker into the paper. This Atmospheric Recorder, the first invented, is the only one at work in any Observatory; Mr. Dollond has, however, another now ready for sale.

The electrical apparatus consists of three exploring wires, (that is independent of the wires belonging to the Atmospheric Reader.) The first extends one hundred and fifty feet in a northern direction, the second two hundred and fifty feet in a south-west direction, and the third seven hundred feet in an easterly direction, the latter is suspended forty feet above the ground; these wires are attached to seven insulators, and are all brought into a room fitted up for the purpose of electrical investigation. The Electrometers used, are Zamboni's dry Pile, for showing whether the electricity is positive or negative, and various gold leaf, dutch metal, thin straw, and pith-ball Electrometers for testing the intensity; when the electricity is powerful, it rings a bell, manufactured of the best bell-metal, and this calls attention to what is taking place in the atmosphere. The Thermometers in use are a wet and dry bulb on glass, self-registering maximum and minimum Thermometers, Negretti's maximum Thermometers, and self-registering maximum and minimum wet-bulb Thermometers, Franklin's Hygrometer, and Daniels' Hygrometer. The Thermometers are hung on a thermometer-stand, in order that the instruments may be free from the errors caused by radiation, reflection, or the absorption of heat; and the Hygrometers upon an hygrometer-stand. The Rain-gauges are placed at various heights.

A Gimbal-vane to tell the angle at which the wind blows, and a Rain-angler to show the angle at which the rain is falling, are erected on the Observatory.

A Transit instrument for procuring correct time from observations of the sun or stars, a clock driving sidereal time, a variation compass for shewing the deviation of the needle from the north, an earthquake pendulum, thirty-three feet long, which records the direction and amount of displacement caused by an earthquake shock, an Ozonometer, on Dr. Moffat's principle, to obtain the amount of ozone in the air, and the various other furniture of an Observatory, including telescopes, sextants, watches, etc., are also amongst the instruments at the Beeston Observatory.

The Highfield House Observatory contains a Standard Barometer, by Newman; wet and dry bulb Thermometers, by Barrow; maximum and minimum Thermometers, by Bennett; maximum Thermometer, by Negretti; Thermometers for shewing the greatest heat in sunshine, and greatest cold on the grass, Rain-gauges at different heights, an Evaporator, an Ozonometer, on Schonbein's construction; a Wind-vane, fifty-four feet high, Lind's Anemometer, etc. These Observatories are half a mile apart.

The latitude of Highfield House is assumed to be about 52° 57′ 30″ north, and the longitude, 1° 10′ west. The Beeston Observatory is west-south-west of Highfield House. The cistern of the Barometer at Highfield House is one hundred and eighty-one feet, and at Beeston, one hundred and forty-nine feet above the sea-level.

Highfield House is situated at almost the summit of a small hill, and there are many trees around it. Beeston Observatory is much less surrounded by trees, not at so great an elevation, yet considerably raised above the valley; a small running brook passes about midway between the two Observatories. Both places are free from the effects of a town, and are admirably situated for meteorological observations; and being so centrally situated in England, the records will give a fair account of the climate of this island, and more especially as the influence of the sea, and of the hilly districts, are too far removed to alter the results obtained.

THE WONDERS OF THE ATMOSPHERE: A POPULAR TREATISE ON METEOROLOGY.

BY EDWARD JOSEPH LOWE, ESQ., F. R. A. S., ETC.

INTRODUCTORY CHAPTER.

In directing our attention to the varied phenomena which are incessantly taking place in the atmosphere, we are immediately astounded at the glorious manner in which all things work in harmony, through the wisdom and foresight of the Almighty. Geology, Physical Geography, Chemistry, Astronomy, and Natural History, each and all are linked together with Meteorology. The peculiar geological construction of a locality modifies its climate; certain soils and rocks absorb considerable heat, whilst others have a greater power of radiating it, that is, driving it back again into space, either to be dissipated and lost to us for ever, or to be arrested by a passing cloud, and driven back again to the earth; and this process to be repeated, perchance, again and again.

The distribution of land and water, mountain chains and morasses, have each their influence. The more distant we are removed from a large expanse of water, the less humid the air becomes; and in the great deserts of Arabia and elsewhere, we find large tracts of land never receiving the refreshing shower, where neither animals nor plants can exist; in such a spot there is complete desolation, but not without a purpose. Here the barren sand will not allow the great heat of an almost vertical sun to penetrate into the ground, for sand is a bad conductor of heat; although on the surface there is an almost burning temperature, at the depth of a few inches it is comparatively cool. The chief portion of the heat is therefore reflected, or in other words, sent back again into the air, rising to a considerable elevation, and then flowing north and south to mingle with and temper the cold air which rushes from the icy climates of the poles.

Mountains have great influence over the climate of a country, being much colder than the adjacent valleys. Clouds, on coming in contact with a mountain, are instantly chilled; and at a lower temperature, they can no longer retain the same volume of suspended water, hence a rapid precipitation of rain is the consequence. It is a grand arrangement of nature that mountain ridges should receive more moisture than the surrounding country, for they are best able to supply water to the land below them by the streamlets which trickle down their sides; and we see, by this beautiful law of nature, the clouds hastening to discharge volumes of water on their summits, wasting but little of their contents on the adjoining plains. Vapour is an inveterate traveller; at one time flowing in the tropical seas, anon amongst mountainous icebergs; at another, floating in the air, at first invisible, and then with its innumerable companions, drifting in the clouds, at length to descend, either as rain to give refreshment to the thirsty tropical plant, or in a snow-flake near the pole. The drop of dew which now hangs from the leaflet, like a glistening pearl, who shall tell where to-morrow it may be?

Again, a range of hills have an effect on the winds, deflecting them from their original course; for an ocean of air rushing with a velocity and force sufficient to upset the noble trees of the forests, which have hitherto withstood the storms of ages, has frequently not the power to pass over a mountain, so that on the other side, there is a shelter from the tempest.

(To be continued.)

AMOUNT OF RAIN FALLEN AT HIGHFIELD HOUSE, IN JUNE, DURING THE PAST TWELVE YEARS.

1844,	1.6 inches,	1850,	1.4 inches,
1845,	2.9 "	1851,	3.4 "
1846,	1.7 "	1852,	4.9 "
1847,	2.0 "	1853,	5.0 "
1848,	4.7 "	1854,	1.0 "
1849,	2.7 "	1855,	2.4 "

STATE OF THE WEATHER IN JUNE, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY.

1st., rainy day. 2nd., overcast, misty evening. 3rd., fine, from 5 p.m. to 6 p.m. a solar halo. 4th., dull, from 9 a.m. fine. 5th. overcast, with boisterous wind, evening calm. 6th., fine, 6h. 30m. p.m. a rainbow, from 8 till 11 p.m. vivid lightning. 7th., fine, solar halo. 8th., fine, thunder storm at noon with heavy rain, much electricity for ten minutes at 2h. 30m. p.m., and again at 3h. 15m.—thunder and lightning with heavy rain and hail; the storm moved in a S S W. current; evening fine. 9th., fine, much electricity at noon, thunder and lightning with showers of rain; storms moved in a S S W. current. 10th., fine, shower of rain at 7 p.m.; at 8h. 30m. p.m. thunder and lightning. 11th., very fine. 12th., fine. 13th., overcast, rain commenced at 12h. 30m. p.m. and continued. 14th., rain until noon, then fair. 15th., thunder clouds; at 10h. 30m. a.m., vivid lightning and loud thunder, frequent storms with thunder and lightning during the afternoon. 16th. fine, with frequent storms of thunder and lightning. 17th., overcast, from 12h. 30m. till 6h. 30m., p.m., heavy showers of rain. 18th., from 9 a.m. till 9 p.m. rain. 19th., fine. 20th., fine. 21st., very fine. 22nd., fine. 23rd., overcast; rain from 10h. till 11h. 30m. a.m., afterwards fine. 24th., fine. 25th., overcast. 26th., fine, cloudless night with copious dew, and white stratus in the valley. 27th., very fine, stratus in the valley in the evening. 28th., very fine. 29th., fine. 30th., fine.

The following is the result of observations made at Highfield House, in June 1855:—

Mean height of the barometer for the month, corrected and reduced to 32° F., (altitude of cistern above the sea level being 181 feet,) 29.830 inches.

Mean pressure of dry air, or that of the gases, 29.461 inches.

Elastic force of vapour, or mean pressure of the water contained in the air, 0.369 of an inch.

Mean temperature of the dry-bulb thermometer, corrected for diurnal range, 57.2°.

Mean temperature of the greatest heat and greatest cold of each day, corrected for diurnal range, 55.3°.

Adopted mean temperature 56.2°.

Mean temperature of June from 1809 to 1852, 58.7°.

Mean temperature of June from 1847 to 1854, 57.5°.

Mean temperature of June from 1810 to 1820, 58.1°.

Mean temperature of June from 1820 to 1830 58.5°.

Mean temperature of June from 1830 to 1840 58.9°.

Mean temperature of June from 1840 to 1850 59.0°.

Excess or defect of June, 1855, from the mean of the last seven years — 1.3°.

Excess or defect of June, 1855, from the mean of forty-two years — 2.5°.

Mean temperature of the wet-bulb thermometer, corrected for diurnal range, 52.7°.

Greatest cold of the night 39.8°, (on the 18th.)

Greatest heat of the day, in shade, 83.3°, (on the 6th. and 28th.)

Range of temperature, 43.5°.

Mean of the greatest cold of each night, 47.1°.

Mean of the greatest heat, in shade, of each day, 67.1°.

Diurnal range of temperature, 20.0°

Minimum temperature on grass, 36.0° (on the 21st.)

Maximum temperature in sunshine 97° (on the 28th.)

Range of temperature between the greatest cold on grass, and greatest heat in sunshine, 61.0°

Mean minimum temperature on grass, 43.8°.

Mean maximum heat in sunshine, for June, 1855, 76.2°.

Diurnal range of the mean maximum temperature in sunshine, and mean minimum temperature on grass, 32.4°.

Greatest amount of solar radiation, 18.3°, which occurred on the 11th.

Greatest amount of terrestrial radiation 7.9°, which occurred on the 6th.

Mean temperature of evaporation, 51.7°.

Mean temperature of the dew point, 49.7°.

Mean amount of ozone, 4.8°.

Mean amount of ozone in the night, 4.7°.

Mean amount of ozone in the day, 4.8°.

Number of nights without ozone, 8.

Number of days without ozone, 3.

Mean amount of ozone with a west wind, 5.0°.

Mean amount of ozone with a north-west wind, 5.7°.

Mean amount of ozone with a north wind, 7.8°.

Mean amount of ozone with a north-east wind, 5.0°.

Mean amount of ozone with an east wind, 3.3°.

Mean amount of ozone with a south-east wind, 1.5°.

Mean amount of ozone with a south wind, 4.5°.

Mean amount of ozone with a south-west wind, 5.5°.

Amount of rain fallen twenty-five feet from the ground, 2.407 inches.

Amount of rain fallen two feet from the ground, 2.558 inches.

Number of days on which rain fell, 13.

Amount of evaporation 4.911 inches.

Mean daily amount of evaporation, 0.163 of an inch.

Greatest amount of evaporation in twenty-four hours, 0.295 of an inch.

Least amount of evaporation in twenty-fours, 0.024 of an inch.

Mean amount of cloud at 9. a.m., 7.8°.

Mean amount of cloud at 10 p.m., 6.5°.

Mean daily amount of cloud, 7.1°.

Number of days overcast at 9 a.m., 12.

Number of days overcast at 10 p.m., 11.

Number of days cloudless at 9 a.m., 1.

Number of days cloudless at 10 p.m., 4.

Greatest height of the barometer, (reduced,) 30.286 inches, (on the 20th.)

Least height of the barometer, (reduced,) 29.037 inches, (on the 15th.)

Range of the barometer, 1.249 inches.

Mean pressure of June from 1847 to 1854, 29.746 inches.

Excess or defect of the pressure from the average in June, 1855, + 096 of an inch.

Mean weight of vapour in a cubic foot of air, 4.2 grains.

Average mean weight of vapour in a cubic foot of air, between 1848 and 1854, 4.6 grains; excess or defect in 1854 of the mean weight of vapour in a cubic foot of air – 0.4 grains.

Additional weight of vapour required to saturate a cubic foot of air, 1.2 grains.

Average additional weight of vapour required to saturate a cubic foot of air between 1848 and 1854, 1.0 grain.

Excess or defect in 1854 of the additional weight of vapour required to saturate a cubic foot of air, + 0.2 of a grain.

Degree of humidity, (complete saturation being 1.000,) 0.775.

Mean temperature of the dew point between 1847 and 1854, for June, 52.0°.

Excess or defect, in 1855, of the mean dew point, – 2.3°.

Mean weight of a cubic foot of air, 529.5 grains.

Average mean weight of a cubic foot of air between 1848 and 1854, 527.0 grains.

Excess or defect of the mean weight of a cubic foot of air in June, 1855, + 2.5 grains.

Whole amount of water in a vertical column of the atmosphere, 5.1 inches.

Average whole amount of water in a vertical column of the atmosphere for June for the past five years, 5.0 inches.

Excess or defect in June, 1855, of the whole amount of water in a vertical column of the atmosphere, + 0.1 of an inch.

Average amount of evaporation in June, between 1848 and 1854, 5.1 inches.

Excess or defect in the amount of evaporation from the mean in 1855, – 0.2 of an inch.

Average amount of rain in June during the past eleven years, 2.8 inches.

Excess or defect in June, 1855, of the average fall of rain, – 0.4 of an inch.

Mean degree of humidity from 1848 to 1854, 0.821.

Excess or defect in 1855 of the mean degree of humidity, 0.046°, (+ signifies above, and – below the average.)

From the foregoing it will be seen that the month was cold, that three-fourths of the sky was covered with cloud, the barometer slightly above the average, and that the amount of rain was 0.4 of an inch less than the average.

DIRECTION OF THE WIND.
AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN JUNE, 1855.

1st.—NORTH all day, in oscillations reaching E and WNW.

2nd.—South until 6 p m, then W in oscillations.

3rd.—SSW all day.

4th.—SW and steady till 8 p m, then oscillating on SSW, reaching E and W.

5th.—SSW till 10 a m, then SE, steady till 7 p m, after which oscillations.

6th.—SE till 9 p m, then veered through the S to SSW, and became nearly steady.

7th.—SSW till 1h. 30m. p m, then W, became SW at 3h. 45m. p m, W at 7h. 45m. p m, then oscillating considerably on WSW till 8h. 30m. p m, after which steady in SW.

8th.—Steady until 6 p m, then oscillated, (oscillating violently from 8h. 30m. p m till 9 p m,) WSW till 1h. 30m. a m, W till 9h. 15m. a m, SW for two hours, SSW till 2h. 30m. p m, then mostly W till 3 p m, after which SW, becoming nearly S at midnight.

9th.—Oscillating considerably until 10 p m, when steady; at midnight S, became SSW at 7 a m, (oscillating from WSW to SE,) from 5 p m till 8 p m changeable, being alternately W, SW, WNW, S, SE, ESE, and N. At 8 p m SW, gradually becoming more westerly, being W at 10 p m, then SW at 10h. 30m. p m, after which W.

10th.—Oscillating gently, W all day, (except from 6 till 6h. 30m. a m, when N and then NE.) No oscillations after 10 p m.

11th.—Steady till 8h. 30m. a m, then oscillated considerably for five hours, after which gently. Between midnight and 8 a m, gradually changed from W through N to E, was ENE three hours, then gradually moved back again through N to NW, was NW for 15m., then NNW for 15m., then moved through N to NE, being NE for 15m., after which moved through the N to W, and gradually back again to E, becoming NE, and then remaining ENE until 1h. 30m. p m, after which E for the remainder of the day.

12th.—Perfectly steady until 9h. 30m. a m, then oscillated gently till 7 p m, then again steady; ENE till 1h. 45m. a m, then moved steadily towards N, becoming N at 3h. 30m. a m. At 4h. 30m. a m, moved steadily to NW, becoming WNW, and remaining in that quarter till 7h. 30m. a m, then passed through the N to E, until 6h. 30m. p m, being ENE until nearly midnight, when it became N.

13th.—Perfectly steady till 7 a m, then oscillated, the oscillations becoming violent after 6 p m. Until 5h. 30m. a m, moved steadily about N, being occasionally NNE and NNW, then NE until 9h. 30m. a m, then ENE till noon, then NE and gradually becoming NNE, remaining in this quarter all day, with rapid oscillations reaching E and W.

14th.—Violent oscillations till 1 a m, then gentle oscillations. N till 1 a m, then WNW till 5 a m, then W till 8 p m, then gradually moved towards S, becoming S at 10 p m, and continued so. (From 6 p m till 6 a m, of the 15th., the wave of movement was beautifully recorded upon the paper, the movement being so marked, and gradually, that it may possibly be traced in other localities.)

15th.—Oscillations all day, being most violent between midnight and 1 p m. SSE till 2h. 30m. a m, then gradually veered to SW, becoming WSW at 4h. 30m. a m, and W at 12h. 15m. p m. At 8 p m, SW, and at 9h. 30m. p m, WSW.

16th.—Steady till 5 a m, then gentle oscillations till 4h. 30m. p m, then rapid oscillations. WSW till 4h. 45m. a m, then SW, becoming WSW at 5 a m, SW at 8h. 30m. a m, WSW at 10 a m, W at 11h. 30m. a m, NW at noon, then very changeable till 5 p m, (being in every point of the compass,) then WNW, becoming slightly nearer the W at 9 p m. At midnight the wind made a complete revolution, and then became NNW.

17th.—Very rapid oscillations till 7 p m, then nearly steady. General direction NW, (the oscillations reaching W and ESE,) at 6h. 30m. p m W with one or two veerings to NNE through the N.

18th.—Oscillating, except between 4h. 30m. p m and 7 p m, when the wind was calm, W till 11 a m, then WSW till 11h. 15m. a m, then S till 1h. 30m. p m, SW till 3 p m, SSW till 7 p m, wind stationary in SSW from 4h. 30m. p m, (without a single movement for two hours and a half,) when at 7 p m, it suddenly swept through S and E to NW, and then began to oscillate in that quarter, remaining NW without moving farther than ENE and NNW.

19th.—Oscillating about NE, becoming NNE at 5 a m, then oscillations less in number but greater in arc until 2 p m, being mostly NE, occasionally NW, and twice W, from 2 p m E veering but little.

20th.—Steady in ENE till 4 a m, then oscillating in NE till 2 p m, when mostly N, (veering to E and to WNW,) after which nearly steady in ENE.

21st.—Steady in ENE till 1 a m, then NE at 5h. 30m. a m, oscillated about ENE till 8 p m, then steady in ENE.

22nd.—Steady till 8 a m. Changing at midnight to NNW through the N, 1 a m WNW till 8 a m, then veered through N to NE for an hour, then NW for an hour, after which NE, ceased oscillating at 4h. 30m. p m, but remained NE till 6h. 15m. p m, then removed to WNW through the N, and in 30m. back again to E, returning in a few minutes to NE. At 9h. 30m. p m, moved through N to WNW, where it remained.

23rd.—Small oscillations about WNW till 8 a m, then gradually moved to N, became NE at 11 a m, with more oscillations, at 3h. 30m. p m, NNE and then N, at 5h. 15m. p m, moved to WNW and back to N. at 6h. 15m. p m, become NNE for an hour, after which WNW.

24th.—Small oscillations till 5h. 30m. a m in WNW, then rapid oscillations in W by N 6h. 15m. p m, then wind WSW.

25th.—Rapid but small oscillations in WSW, becoming W at 7 a m, only nine oscillations reached SW, and none moved beyond WNW.

26th.—Small oscillations in W, becoming greater at 9 a m, the oscillations ceased at 7 p m, then steady in WNW.

27th.—Between midnight and 1 a m the wind gradually moved from WNW back to W and to SW, immediately returning to W, then to SSW where it remained an hour, then becoming WSW. Began to oscillate at 7 a m, becoming SW, and occasionally through S to SE, between 10 a m and 2 p m, variable moving from SW to W, then S to SE, back to SW, then S, then W and NW, W, S, to ESE. The wind became steady in ESE and E.

28th.—ESE till 2 a m, (being steady and without oscillations until noon.) At two a m veered to NE, and at 2h. 15m. a m to ENE. At 7h. 30m. a m, moved through E to SE, and then through S to SSW, and until 10 a m moved backwards and forwards from SE to SSW, then moved to W, becoming S until 11h. 30m. a m, then SE, gradually becoming ESE. At 11h. 45m. a m, began to oscillate about ESE until 10h. 30m. p m, then steady in ESE and E.

29th.—Wind steady in E and ENE until 7h. 45m. a m, then oscillated about ESE until 5h. 30m. p m, then small oscillations on E for the remainder of the day.

30th.—ENE, with small oscillations until 4h. 45m. a m. From this time until 9 a m, a gradual change of the wind took place, the oscillations ceasing. The direction was first NE, then gradually worked to E, and then forwards through the S to SW, where it again began to oscillate, and continued to do so from 9 a m till 6 p m, then steady in SW.

FORCE OF THE WIND,
AS MARKED BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, DURING JUNE, 1855.

1st.—A steady pressure of 4 oz. on the square foot.

2nd.—Calm.

3rd.—Calm, except from 6 to 9 p. m., when 3 lb.

4th.—A pressure varying from 6 oz. to 2 lb.

5th.—A steady pressure of 5 oz.

6th.—Calm.

7th.—Calm, except between 4 p. m. and 7 p. m., when occasional gusts of 6 oz. pressure.

8th.—Calm, except from 11h. 30m. a. m., till 2h. 45m. p. m., when a pressure of $\frac{1}{4}$ lb.; and at 2h. 15m. p. m., till 2h. 30m., a pressure of 2 lb.

9th.—Calm till 4 a. m., then $\frac{1}{4}$ lb. pressure till 5 a. m, then calm till 6h. 30m. a. m., after which a heavy wind till 6 p. m.; at 8 a. m. being 1 lb., becoming $1\frac{3}{4}$ lb. at 11 a. m., then nearly calm for an hour, after which more violent, being nearly 3 lb. at 4 p. m., and 2 lb. at 6 p. m.; at 7h. 30m. p. m., became calm.

10th.—Calm all day.

11th.—Calm all day.

12th.—Calm all day.

13th.—Calm till 9h. 30m., a. m., then a breeze varying from 4 to 8 oz., until 10 p. m., after which hour again calm.

14th.—Calm till 8 a. m., then brisk till 7 p. m., being at the greatest force at 1 p. m., namely 1¾ lb. pressure on the square foot, and seldom less than ½ lb. Calm from 7 p. m., till 7h. 45m. p. m., then a pressure of 7 oz.; calm from 8 p. m. till 11 p. m., after which a pressure of 2 oz., with one gust at 11h. 15m. p. m., of 1½ lb.

15th.—The force of the wind gradually increased from 4 oz. at 1 a. m., to 7 oz. at 3 a. m., being most violent between 6 a. m. and noon; the average force 1½ lb., and the greatest force 2 lb. At noon nearly calm for half an hour; at 1h. 45m. p. m., in a thunder storm, for five minutes 2 lb., then 6 oz. till 2h. 45m. p. m., when it reached 1¼ lb. From 3h. 30m. p. m. till 5 p. m., 4 oz., after which, calm, except for five minutes at 7h. 30m. p. m., when 3 oz.

16th.—Calm till 5 p. m., except for fifteen minutes at noon, when 7 oz. From 5 p. m. till 7h. 15m., 4 oz., then calm till 10 p. m., with the exception of occasional gusts. From 10 p. m. till midnight became windy, being 1 lb. at 10h. 30m., and 7 oz. at midnight.

17th.—A gale from midnight till 5 p. m., the average force 1 lb., the greatest force, which occurred at 7 a. m., 2½ lb. Calm after 5 p. m., except at 5h. 45m., when 5 oz., and at 6h. 45m., when 3 oz.

18th.—Breeze of 3 oz till 5 p. m., except from 9h. 30m. a. m. till 11 a. m., when 1¼ lb. Calm from 5 p. m. till 7h. 30m., then 4 oz., becoming 6 oz. at 9h. 30m. p. m.; nearly calm from 10 p. m. till 10h. 30m., then 4 oz.

19th.—Until 1h. 30m. a. m., a breeze varying from 4 oz. to 9 oz., then calm.

20th.—Calm till 9h. 30m. a. m., then 4 oz. till 3 p. m., 2 oz. till 7 p. m., then calm.

21st.—Calm till 8 a. m., then 4 oz. till 4 p. m., then 1 oz.

22nd.—Calm till 10 a. m., then a slight pressure till 10 p. m., without gusts, after which calm.

23rd.—Calm, except from noon till 2 p. m., when a pressure of 5 oz. to 7 oz.

24th.—Calm till 6 a. m., from which time till 6h. 15m. p. m., constant gusts varying from 3 oz. to 1¼ lb., mostly 1 lb. pressure, most violent from 2 p. m. till 4 p. m.; calm from 6h. 15m. p. m. till 10h. 45m. p. m.; then 7 oz. till 11h. 15m. p. m., after which 4 oz.

25th.—Gentle breeze till 3h. 30m. a. m., then calm till 6h. 15m. a. m., then suddenly a gale till 11 p. m., being 1 lb. 6 oz. till 8 a. m., then 1 lb. 10 oz. till 1 p. m., when 2¼ lb., after which 1 lb. 6 oz. till 3h. 30m. p. m., then more violent till 7 p. m., reaching 4 lb. at 5 p. m.; after 11 p. m. 1 lb.

26th.—1 lb. till 1 a. m., then nearly calm for three hours, then a force varying from 4 oz. to 8 oz., being 1½ lb. at 2h. 30m. p. m.; ceased at 6 p. m., after which calm.

27th.—Calm till noon, then a constant pressure of about 1 oz.

28th.—Calm till 11 a. m., then a steady pressure of 1 oz.

29th.—Calm till 8 a. m., then a brisk breeze till 7 p. m., varying from 3 oz. to 1¼ lb. after which nearly calm.

30th.—Calm till 9h. 15m., then a pressure of 3 oz. to 8 oz., until 4h. 15m. p. m., when the force increased to 1 lb. 12 oz., becoming 1 lb. at 4h. 45m. Calm after 7 p. m.

The pressure is always that on a square foot.

ELECTRICITY AT THE BEESTON OBSERVATORY, DURING JUNE, 1855.

From the 1st. to the 7th. scarcely any Electricity, the air constantly conducting.

8th.—At 2h. 30m. p. m., much Electricity, the Electrical bells ringing, and all the Electrometers striking the sides, and again at 3h. 15m. p. m.

9th.—At 3h. 15m. p. m., powerful, bells ringing, and again, (but less in amount,) at 6h. 15m. p. m.

10th.—Scarcely any. Positive.

11th.—None.

12th.—None.

13th.—None.

14th.—None.

15th.—Recorded at noon, and very powerfully at from 1h. 30m. p. m., till 1h. 45m. p. m., and again from 3 p. m., till 3h. 30m. p. m., the bells ringing.

16th.—From 11h. 45m. a. m., till 12h. 15m. p. m., much in amount.

17th.—From 6h. 30m. till 7h. 30m. much Electricity recorded during a shower of rain. No thunder.

18th.—None.

19th.—None.

20th.—None.

21st.—Small amount, negative, air insulating.

22nd.—Small amount, negative, air insulating.

23rd.—Just enough to expand the gold leaves. Positive.

24th.—Just enough to expand the gold leaves. Positive.

25th.—Just enough to expand the gold leaves. Positive.

26th.—None.

27th.—Gold leaves slightly expanded. Positive.

28th.—Gold leaves slightly expanded. Positive.

29th.—Gold leaves slightly expanded. Positive.

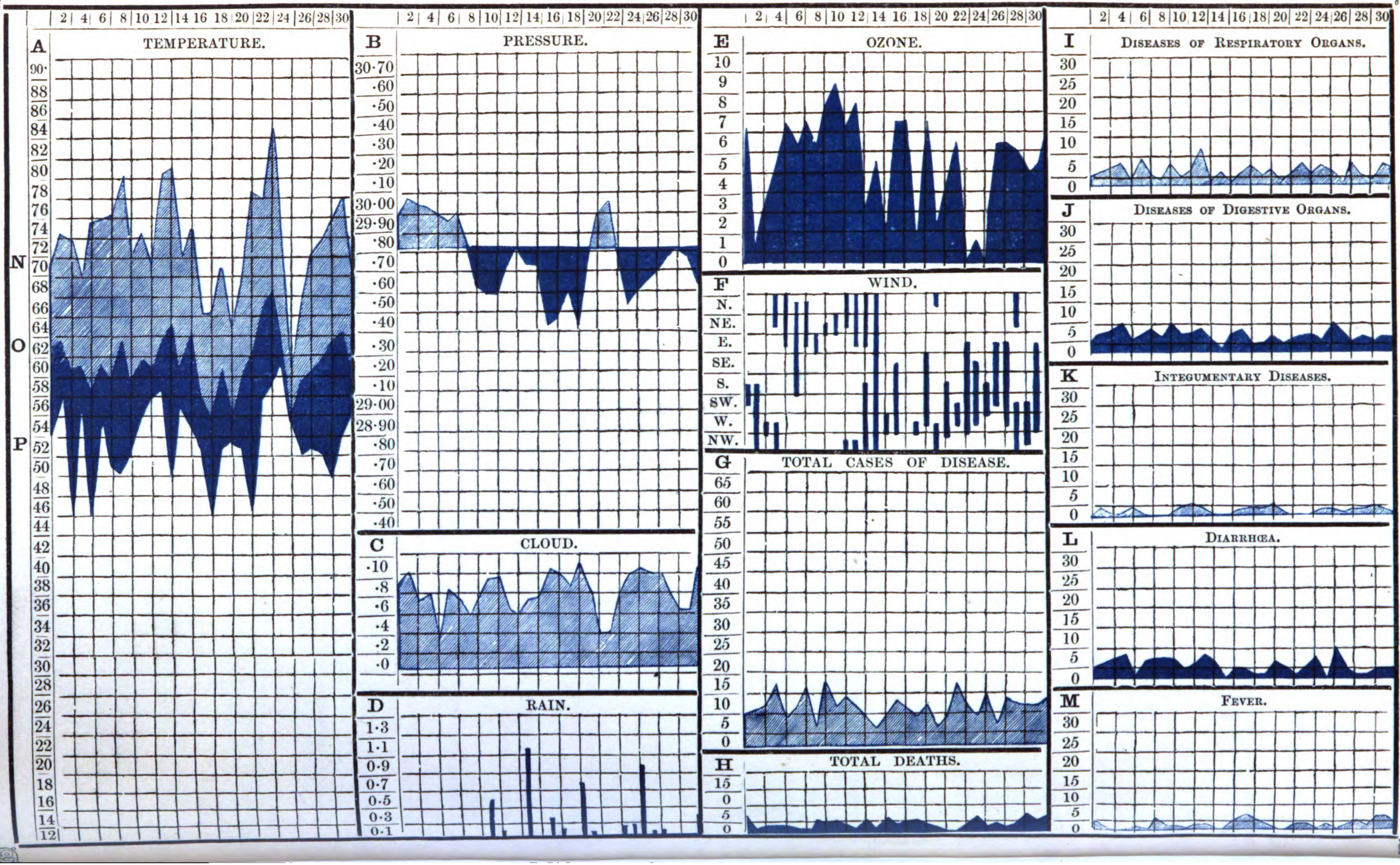
30th.—Gold leaves slightly expanded. Positive.

METEOROLOGICAL TABLE FOR JUNE, 1855,

FROM OBSERVATIONS RECORDED AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

Day of the Week.	Day of the Month.	Mean Pressure of the Barometer.	Temperature of the Air.					Force of Wind.	General Direction of the Wind.	Amount of Ozone.		Amount of Rain.	Amount of evaporation	Temp. of evaporation
			Highest.	Lowest.	Range.	Lowest on Grass.	Adopted Mean.			In the night.	In the day.			
		Inches.	Deg.	Deg.	Deg.	Deg.	Deg.			0–10	0–10	Inches.	Inches.	Deg.
F	1	29.685	49.0	41.2	7.8	40.5	45.0	0.6	N.	10.0	8.0	0.066	0.060	44.1
S	2	.800	57.1	46.5	10.6	45.2	50.4	0.3	S. & W.	7.0	1.0		0.024	48.3
S	3	.695	65.0	47.9	17.1	46.5	55.4	0.5	SSW.	1.0	7.0		0.035	50.7
M	4	.638	60.0	52.0	8.0	49.8	55.2	1.2	SW.	9.0	7.0	0.002	0.140	50.6
T	5	.656	62.4	53.3	9.1	50.2	56.3	1.6	SSW. & SSE.	6.0	5.0		0.220	52.8
W	6	.589	83.3	51.0	32.3	40.6	69.2	0.6	SE. & SSE.	2.0	1.0		0.135	60.0
T	7	.709	70.0	55.0	15.0	49.5	60.1	0.1	W. & SW.	0.0	6.0		0.280	55.8
F	8	.776	69.7	47.1	22.6	40.0	56.6	0.5	SW. & SSW.	7.0	6.0	0.400	0.180	52.3
S	9	.846	63.5	46.7	16.8	41.7	53.8	0.8	SSW. & W.	9.0	8.0	0.072	0.212	50.1
S	10	30.071	71.9	44.2	27.7	39.8	58.4	0.3	SW. & NW.	7.0	8.0	0.018	0.180	53.6
M	11	.112	73.9	47.6	26.3	40.2	58.6	0.5	NNW. & E.	3.0	7.0		0.172	52.3
T	12	29.855	73.8	43.8	30.0	38.0	57.1	0.2	E.	5.0	2.0		0.225	51.3
W	13	.441	65.2	44.5	20.7	39.2	52.8	1.1	E. & N.	5.0	8.0	0.640	0.232	50.2
T	14	.268	62.6	45.6	17.0	44.0	51.9	0.5	W. & S.	8	7	0.320	0.135	50.0
F	15	.068	62.9	49.7	13.2	48.0	54.4	1.2	SSW. & SW.	8	6	0.265	0.125	51.1
S	16	.220	65.6	41.4	24.2	37.8	52.3	0.8	SSW. & NW.	2	7	0.127	0.160	48.3
S	17	.765	59.0	43.8	15.2	44.0	48.6	0.8	NNW.	10	8	0.318	0.095	45.4
M	18	.818	53.7	39.8	13.9	36.4	48.2	1.2	WSW. & ENE.	9	6	0.109	0.149	44.6
T	19	30.075	62.2	41.1	21.1	37.0	50.1	0.3	NE. & ENE.	10	6	0.003	0.088	45.7
W	20	.273	63.6	45.8	17.8	42.5	53.1	0.4	ENE.	0	3		0.140	47.4
T	21	.222	67.3	41.9	25.4	36.0	54.1	0.4	E.	7	1		0.220	47.4
F	22	.074	74.8	41.7	33.1	36.8	60.3	0.1	ENE.	0	0		0.255	53.3
S	23	.065	65.0	52.0	13.0	54.2	56.6	0.3	NE. & W.	0	5	0.067	0.205	53.2
S	24	.064	65.7	44.1	21.6	38.2	55.1	0.7	W. & SW.	6	5		0.070	50.0
M	25	29.937	65.4	51.7	13.7	46.6	58.6	1.5	WNW.	8	0		0.165	54.1
T	26	30.217	71.2	55.0	16.2	57.0	60.3	1.0	NW. & SW.	0	0.5		0.118	57.1
W	27	.207	79.5	45.7	33.8	41.5	64.0	0.1	S. & E.	0	1.5		0.125	57.1
T	28	.094	83.3	55.2	28.1	52.5	67.6	0.4	S. & SSE.	0	0		0.190	60.8
F	29	29.874	80.0	51.5	26.5	48.3	64.9	0.8	E.	3	4.0		0.295	59.6
S	30	.801	73.8	55.5	18.3	53.4	63.5	0.3	S.	0	7		0.280	60.3

JULY, 1855.


2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
A
TEMPERATURE.
90· 88 86 84 82 80 78 76 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12
N
O
P
B
PRESSURE.
30·70 ·60 ·50 ·40 ·30 ·20 ·10 30·00 29·90 ·80 ·70 ·60 ·50 ·40 ·30 ·20 ·10 29·00 28·90 ·80 ·70 ·60 ·50 ·40
C
CLOUD.
·10 ·8 ·6 ·4 ·2 ·0
D
RAIN.
1·3 1·1 0·9 0·7 0·5 0·3 0·1
E
OZONE.
10 9 8 7 6 5 4 3 2 1 0
F
WIND.
N. NE. E. SE. S. SW. W. NW.
G
TOTAL CASES OF DISEASE.
65 60 55 50 45 40 35 30 25 20 15 10 5 0
H
TOTAL DEATHS.
15 0 5 0
I
DISEASES OF RESPIRATORY ORGANS.
30 25 20 15 10 5 0
J
DISEASES OF DIGESTIVE ORGANS.
30 25 20 15 10 5 0
K
INTEGUMENTARY DISEASES.
30 25 20 15 10 5 0
L
DIARRHŒA.
30 25 20 15 10 5 0
M
FEVER.
30 25 20 15 10 5 0

THE COMETS.*

UNDER the above title an exceedingly interesting book is before the public, a work containing more popular information than any other that has hitherto appeared on these wandering bodies.

Comets are only visible to us during the period when they are nearest to the sun, that is, at about the time of their perihelion passage, for they revolve round that luminary in very eccentric orbits. In appearance, they are cloudy or nebulous. During the earlier ages, a large comet was looked upon with terror; fortunately, at the present day, that feeling of dread does not exist, and we are now enabled to examine these singular strangers calmly, and many interesting facts have consequently come to light. From the Christian Era to the present time, more than six hundred comets have been discovered; and of this number one hundred and fifty were detected during the last century and a half, owing, in a great measure, to the invention of telescopes; yet at the same time, partly, to a very diligent search by modern astronomers. Planets all move in orbits that approach that of a circle, and all move in the same direction. They are situated in a particular belt of the heavens termed the ecliptic. Comets, on the contrary, are to be met with in every part of the heavens, and a portion only move in the same direction as the planets, in another portion their direction of movement is *retrograde*.

Mr. Hind, taking into consideration that during the first seventeen hundred years, none but the brighter Comets were detected, and that of the telescopic Comets since discovered, most of them have been detected in the northern hemisphere, very many of these bodies must have escaped notice; consequently he does not think that less than four thousand comets have appeared since the birth of Christ. The period in which a Comet remains visible, varies from a few days to more than five hundred days; generally, two or three months is the extent of their visibility, and this depends upon their capability of reflecting the sun's rays. The Comet of 1811 was visible five hundred and ten days; that of 1825, three hundred and fifty-eight days; that of 1835, two hundred and eighty-six days; and one in 1847, (Mauvais' Comet,) two hundred and eighty-five days. The Comet of A. D. 64, was visible to the unassisted eye for more than one hundred and eighty days, and that of A. D. 247, for one hundred and fifty-six days. The Comet of 1729, although visible six months, only moved over an arc in space of 15°, whilst that of 1769, passed through 240°.

Nearly all the telescopic Comets are nebulous masses, having no nucleus or tail; whilst those visible to the naked eye are mostly accompanied by a tail, and in some instances have a star-like nucleus. Some Comets have been so brilliant as to be visible at noon-day. Mr. Hind mentions the following as the most brilliant on record:—Diodorus Siculus records a

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* "The Comets," by J. R. Hind, Esq., F.R.A.S. London: Parker.

Comet which cast shadows as strongly as those of the moon; another, B. C. 146, was as large as the sun, and dissipated the darkness of the night; the Comets mentioned by Justin were as brilliant as the sun; that of 1106 was seen close to the sun; and those of 1402, 1618, and 1744, were visible in the day-time. The largest in the present century was that of 1843; this stranger in the southern hemisphere was very magnificent. Of the large Comets, twenty-three are recorded as being *white*, twenty *bluish*, four *red*, and two *greenish.*

Some Comets have more than one tail. Those of 1851 and 1854 had two tails, and that of 1774 is said by some astronomers to have had six. The tail of a Comet is mostly turned in a direction opposite to that of the sun; but in this particular they vary considerably, and in the case of some with two tails, one has pointed *towards* the sun. These tails are occasionally of enormous length. The Comet of B. C. 371, had a tail 60° long; that in A. D. 133, 50° long, and 2° wide; that of 178, 50°; that of 390, 100° long; that of 837, 80°; that of 1264, 100°; that of 1362, 100°; that of 1456, 60°; that of 1618, 104°; that of 1680, 90°; that of 1689, 60°; and that of 1843, 65° long.

Pulsations of greater and less brilliancy have been observed in several Comets' tails. The following had undulatory movements:—the Comets of 615, 1607, 1618, 1652, 1661, 1769, 1843, and 1854. In several instances the tail of the Comet was *curved.*

The diameter of the nucleus of a Comet varies in a great degree. One seen in 1815, was five thousand three hundred miles; whilst Biela's Comet has a nucleus of only from seventy to one hundred and twelve miles. The luminous atmosphere, or *coma,* is of great dimensions. The Comet of 1811 was very large, the diameter of its head being above a million of miles. In the greater number of instances, the diameter of the head is, however, less than a hundred thousand miles. The diameter also varies in another respect from that of the planets, changing in an extraordinary manner. Many of these bodies contract when they approach the sun, and become.larger on receding from him. Encke's Comet was nearest to the sun in 1838, on the 19th. of December; its diameter on the 9th. of October was two hundred and eighty-one thousand miles, whilst on the 17th. of December it was only three thousand miles.

If we are astonished at the great magnitude of Comets, we must be still more astonished at the enormous length of their tails. That of 1769 was 40 millions of miles long; one in 1618, 50 millions; those of 1680 and 1811, exceeded 100 millions; and the large Comet of 1843 had a tail 200 millions of miles long, and this enormous tail was formed in less than three weeks.

We know but little of the constitution of these bodies; in all probability they are masses of thin vapour, capable of reflecting the rays of the sun: it is evident they are not solid bodies, from the circumstance that the smaller stars are seen through them.

Most of the Comets move in an eccentric ellipse, almost approaching a parabola.

The third chapter of Mr. Hind's book describes the general methods of calculating the elements, and the effects of planetary attraction upon these vapourish bodies.

The Comet of Halley, (which bears the name of this eminent philosopher, on account of the calculations he made respecting its orbit,) is a very interesting object to astronomers. Mr. Hind devotes twenty-two pages to this Comet, tracing back in the Chinese annals, the re-appearance on twenty-five occasions, commencing eleven years before the birth of our Saviour; the intervals varying from seventy-five to seventy-nine years.

There are two classes of Comets—those with long periods and those with short ones. Amongst the latter are the following:—

1st.—Encke's, which completes the circle of its orbit in three years and a quarter: it will be favourably situated for observation in 1858.

2nd.—Biela's, having a period of six years and a half; its last appearance being in 1852.

3rd.—Faye's, which revolves in its orbit in seven years and a half, and may be expected again in October, 1858.

4th.—De Vico's, having a period of five years and a half. Dr. Brünnow calculates that it will be in perihelion on the 6th. of August, 1855.

5th.—Brorsen's, with a period of five years and a half; this will again appear in 1857.

6th.—D' Arrest's, with a period of six years and a half. It appeared in 1851, being nearest to the sun on July 9th.

Mr. Hind mentions five Comets which have, from unfavourable circumstances of observation been again lost sight of.

Perhaps no Comet has more interest attached than that of 1770, commonly called Lexell's Comet; the perturbations caused by Jupiter have been so great, as to completely alter the form of the ellipse and the period occupied in making a revolution round the sun; the Comet twice encountered the planet, namely, in 1767 and 1779, and the orbit was so deranged from its original ellipse, (when first discovered,) that it may now be said to be *lost*.

There are five Comets, besides the one known as Halley's, having periods of revolution of from sixty-nine to seventy-five years. They are all *direct* in their motion, that is, move in the same direction as the earth, and all have considerable inclination with respect to the ecliptic. These Comets are —Pons, discovered in 1812; Olber's, in 1815; De Vico's fourth, in 1846; Brorsen's third, in 1847; and Westphal's, in 1852.

Amongst the Comets with long periods, a degree of uncertainty hangs over them, as there are many difficulties to encounter in calculating their elements, the following periods may be mentioned:—

The great Comet of 1811, Argelander says has a period of three thousand and sixty-five years; the second Comet of 1811, Nicolai gives as eight hundred and seventy-five years; the fourth Comet of 1822, Encke gives as five thousand four hundred and forty-four years; the great Comet of 1825, Hansan gives as four thousand three hundred and eighty-six years; the fourth Comet of 1840, Götze gives as three hundred and forty-four years; the Comet (Mauvais',) of 1844, Plantamour gives as one hundred and two thousand and fifty years; the Comet (De Vico's 3rd.,) of 1846, Jelinek gives as two thousand seven hundred and twenty years.

In the ninth chapter Mr. Hind describes the most remarkable Comets, about 134, B. C., a Comet occurred as brilliant as the sun, with a tail covering a fourth of the heavens.

A. D. 389, a brilliant Comet with a tail sword-shaped; 891, a Comet with a tail 100° long; 1402, two splendid Comets, which were seen in the *day-time*; 1472, very large, visible in the day-time; 1618, one with a tail 104° long; 1652, one nearly the size of the moon; 1680, a very large Comet; 1744, one with a branched tail; 1769, with a tail from 90° to 100° long; 1811, having a tail 25° long; 1843, the grand Comet of this century, whose tail was 65° long.

The Comet usually called "Hind's expected Comet," from the circumstance of that Astronomer calculating its return, has been fully discussed in the pages of this book. The Comet of 1264 had a tail 100° long, and is one of the finest ever recorded, and a large Comet appeared in 1556. Mr. Hind considers these two appearances of the same body, having a period in round numbers, of about three hundred years: the calculations shew that it will be nearest the sun again in August, 1858, but there is an uncertainty of two years, therefore we may hope to see this glorious object between 1856 and 1860.

A catalogue of the orbits of all the Comets hitherto computed is appended.

Of late years the astronomers who have discovered the most Comets, are Messier, Mechain, Miss Herschel, Pons, Bouvard, Gambart, Galle, Mauvais, Faye, De Vico, Brorsen, Colla, D' Arrest, Petersen, and Klinkerfues.

We have hurriedly gleaned from Mr. Hind's book the present history of Comets; the volume is so full of interest that we cannot refrain from referring the reader to it, feeling convinced that he will experience great pleasure and receive considerable information respecting these singular bodies, from a perusal of Hind's important book.

METEOR SEEN AT THE OBSERVATORY, BEESTON, ON THE 13th. OF JUNE, 1855.

At 11h. 14m. 30s. p. m., a very large Meteor moved very slowly from the star ε Serpentis through δ Ophiuchi, and faded away near ζ Ophichi: this Meteor suddenly increased in size and brightness. When first seen it was of about the apparent size of a star of the second magnitude, subsequently it became twice the apparent diameter of Jupiter, and four times as brilliant as that planet; it disappeared instantaneously when at its maximum brightness. It was circular in form with a single ray of light preceding, and attached to this circular globe. The colour was an intense blue. It was visible for two seconds.

ATMOSPHERIC ELECTRICITY.

In order to examine the intensity and other interesting properties of Atmospheric Electricity, it is requisite that all communication with the ground shall be prevented, and to effect this, substances that are non-conductors of electricity must interpose between the wire that collects the electricity and the support which suspends it in the air. Unfortunately for these experiments water is a good conductor, it therefore requires great care in the construction of insulators in order to procure perfect insulation.

From a wire hung in the air and insulated from the ground, and having various delicate electrometers attached, many interesting facts are elicited. The air is sometimes found to be charged with a great amount of electricity, and at others, scarcely a trace of any can be perceived. The air is at one time seen to be charged with *positive*, and at another with *negative*, electricity; and thirdly, the air at one time conducts the Atmospheric Electricity freely to the earth, whilst at another it remains in an insulated state.

The influence of a flash of lightning upon the wires, when even at a distance of from three to five miles is very apparent, and with nearer lightning, that is, with flashes within the distance of a mile, the effect produced is exceedingly curious.

On the 27th. of the present month, with a storm, whose nearest edge was four miles and a half north of this place, the flashes of lightning caused the straw and pith-ball electrometers to strike the sides at the instant that each discharge occurred, shewing that although the flash itself was several miles off, the electricity along the wires was greatly disturbed by it.

If the amount of electricity in the air increases when a thunder-storm is not present, the action of the electrometer is steady, the gold leaves or pith-balls expanding with precision; on the contrary, before a flash of lightning takes place, for several seconds, the instruments become much disturbed, the gold leaves commence expanding and contracting, in a similar manner to the movement of a butterfly when opening and closing its wings, and immediately before the flash is seen, the pith-balls become suddenly convulsed, and for the moment the action seems paralyzed, after which the sides of the electrometer are struck violently.

When the wires are fully charged with electricity, sparks from an eighth of an inch, to half an inch in length can be obtained, and the shock received on touching the wires, seems to be more powerful than a spark of the same length taken from an electrical machine.

THE WONDERS OF THE ATMOSPHERE: A POPULAR TREATISE ON METEOROLOGY.

BY EDWARD JOSEPH LOWE, ESQ., F. R. A. S., ETC.

(Continued from Page 15.)

Chemistry is, perhaps, as intimately connected with Meteorology as any other science; its agency is everywhere at work; by its aid we are enabled to separate the different constituents of the air, so that the gaseous and invisible atmosphere which surrounds us on all sides, is, by its all-powerful help, weighed, investigated, and brought to light. From it we learn that we are not enveloped by a single gas, but by certain combinations of several gases. If we place a number of thermometers on various fragments of rocks and other substances, we find that a different temperature is indicated by each thermometer; a chemical analyzation informs us what each substance contains, and we are at once aware of the causes of this variation.

Meteorology may with truth be said to be a part of Astronomy, for the same sun around which our earth is carried in her annual tour, gives us light and heat, greater or less, according as he is more or less vertical to us; hence the heat of the equator, and the cold of the poles. It is the different temperature of different masses of air which produces the pleasant breeze or the destructive hurricane; it is the diurnal motion of the earth on its axis from west to east, which diverts the north and south polar currents to the eastward. To the peculiar position of the sun we owe our summer's heat; our winter's cold, our snow shower, and our thunder storm. To the gravitation of the earth we are indebted for retaining our atmosphere; without it the air would be quickly dissipated in space.

Lastly, Botany and Natural History are no less intimately connected with Meteorology. The atmosphere is the life of the animal and the plant, without it God's image, *Man*, would cease to live. Different climates have their different species of animals and plants. If we introduce an animal or plant from the tropics, it perishes with cold; or if we transport to those regions one of our animals or plants, it is destroyed by the heat. The animals of hot countries have a short thin coat of hair, whilst those of cold climates are enveloped in thick warm wool. Tropical plants protect their fruit from the scorching sun, but plants of colder climates have it exposed, in order to obtain every ray that may fall upon it. Alpine plants are constructed that they may drink in every drop of water which, in the form of rain or dew, descends upon them; whilst the aquatic plant throws all the moisture off. For the benefit of man are all these things arranged. Man is able to accommodate himself to almost any climate, be it a burning desert or a frozen region. Men have travelled across the burning tracks of sand, and wintered with the polar ice. The wants of man vary according to the latitude in which he dwells; if in a tropical climate, he requires shade, cool clothing, and a vegetable diet; for shade he has the overhanging forests, for clothing the cotton-fields find him materials, and for food he has delicious fruits and the produce of the rice-fields. If in the temperate zones, he is surrounded by corn, oxen, and sheep, for his food, wool for his clothing, and coal for his fires. In the frozen zones, he is supplied with food from the bear and the reindeer, with warm clothing from the beasts of the chase clothed with thick furs, and with fire from the fir trees and the birch.

Man is not only able to endure the most opposite climates, but it is also in his power to temper that in which he lives. Thus, our northern countries are rendered milder by the clearing of large forests, the draining of morasses, and the building of cities. By design are all things in nature united in harmony and action for the happiness of man; would that man were more in harmony with nature!

The various branches of Meteorology have not, until of late years, received that attention which has been devoted to other scientific subjects; the superstitious notions concerning the changes of the weather, together with the numerous pretended weather almanacks, had caused the science to be much neglected; and the absurd predictions of the Astro-meteorologists, persons who predicted certain states of the weather by certain positions of the planets, had almost given this important subject a death-blow; when, happily, a corps of steady observers gradually sprung up, and now, by their united efforts, Meteorology will, it is to be hoped, make rapid progress toward the development of those laws by which atmospheric changes are governed. This study is one of the greatest moment to the inhabitants of this globe, and it is only necessary to mention the advantages to be derived by one or two classes of the community to convince every one of its importance. To the medical man who watches with intense anxiety, the fearful ravages of various diseases, it must be of interest, when it is seen that certain epidemics occur at certain conditions of the atmosphere, that one class of diseases makes its appearance during the hottest portions of each cycle of seasons, and another class occur at the coldest portions of these cycles. How closely connected man is with the changes of the atmosphere is shown by the Registrar General's returns of deaths, for we find that a decrease of the temperature in London from 45° to 32° will cause three hundred more deaths during the following week than the average number. To the mariner who dreads the storm at sea a more intimate knowledge is cheerfully welcomed, and he has much to thank such meteorologists as Colonel Reid and Mr. Redfield, for their researches on tropical storms; for in a great measure he may now not only have a warning of the approach of these mighty whirlwinds, but one in sufficient time to enable him to sail away from where the vortex or centre of their fury is likely to be, and thus to escape shipwreck, and in all probability to be but little injured by these mighty hurricanes of the tropics.

To the agriculturist it is essential, in order that he may know what crops will be most profitable under certain local peculiarities of climate; for agricultural results will always be dependent on the character of the seasons. The discovery of Actinism, (a third property of the sun,) has thrown much additional light on this subject, and we now can perceive that light and heat alone are not sufficient to sustain the vegetable kingdom, there requires something more, something to impart vigour to the plant, a chemical action, a vitality, and this action and vitality is actinism; and further, the discovery of ozone in the atmosphere, has added another important subject for careful investigation. Lastly, to the public in general, with what attention will they listen to the advances of this science, when they see, as an instance, that, since the year 1771, (which was the commencement of meteorological observations by the Royal Society,) we have had during the cold years of each cycle of seasons, a period remarkable for high-priced provisions, increased mortality, popular discontent, and political changes.

Electricity has made rapid advances during the last few years; we have learned that electricity is always present in the air, we can not only draw lightning from the thunder cloud, but from the serene sky; we can not only collect electricity from the atmosphere on the sultry summer's day, but from the cold wintry snow-storm. Magnetism has also been further developed; we find that all substances, be they liquid or solid, are either magnetic or dia-magnetic, that if hung between the poles of a powerful magnet, they will either remain at rest parallel with magnetic currents, or, if dia-magnetic, at right angles to those currents. Mr. Glaisher has given to the meteorologist many important tables for the calculation and reduction of observations; the construction of various self-registering instruments have tended to lessen their labours very materially; and the researches of Faraday, Kaempt, Howard, Dalton, Martins, Dove, Drew, Lawson, Heis, Bravais, Humboldt, Pouillet, Ramond, De Saussure, Gay-Lussac, and a host of other philosophers have done much towards unfolding the laws by which this science is governed.

The science of Meteorology requires the combined efforts of many philosophers carefully following a well-concerted plan, using the same class of instruments, and reducing their observations in the same manner; with this view the "British Meteorological Society" has been established, the chief object of which is to collect correct manuscript observations, to publish tables, to reduce observations to useful results, to distribute Meteorological papers, to examine Meteorological instruments, and, in short, to encourage and promote Meteorological science.

What a glorious subject for contemplation does our atmosphere become, when we allow our thoughts to dwell upon it. A subtle invisible fluid, the essential of life, surrounding the whole earth, pressed down and retained about us by gravitation, not as a stagnant and poisonous mass, but kept in continual motion by various currents. This atmosphere is a part of us, we live in it exactly in the same manner as fish live in water, and after death are resolved again into it. It is at one time unseen by us, whilst at another it is rendered visible by the partial condensation of the water contained in it into clouds; when more condensed the air becomes darkened, and the thirsty earth receives a supply of refreshing rain, or a pure white carpet of snow of the most varied and beautiful of forms is interwoven and spread upon the ground. At one period it is at rest, with not a leaf stirring, whilst at another, as a violent hurricane, it upturns the firmly-rooted forests. Again, with its burning influence, it is scorching up the ground, and carrying particle after particle of moisture invisibly into the air, until large pools of water are dissipated and dry; whilst anon with its frosty touch it is congealing the water into a solid mass. And if we view the varied and beautiful phenomena which are constantly taking place in our atmosphere, whether it be the fiery meteor shooting along the sky, the swift lightning from the vast thunder-cloud, the bright circles surrounding the sun and moon, and the mock images of those luminaries; the rainbow—the sacred bow of heaven, the many-coloured aurora borealis, or the gorgeous tints of sunset, we are filled with emotions of joy and admiration, and are ready to exclaim "these are thy glorious works, parent of good;" or with the immortal Milton to declare—

> "Ye mists and exhalations, that now rise
> From hill or steaming lake, dusky or grey,
> 'Till the sun paint your fleecy skirts with gold,
> In honour to the world's Great Author, rise;
> Whether to deck with clouds the uncoloured sky,
> Or wet the thirsty earth with falling showers,
> Rising or falling, still advance His praise."

SNOW CRYSTALS.

BY THE EDITOR.

NOTHING can exceed the diversity of form and beauty of Snow Crystals. The water crystallizes in hexagonals, that is, each Snow Crystal contains six similar branches or sides. The severe winter of 1855 was unusually rich in these exquisite Crystals. Mrs. Glaisher sketched some very beautiful ones at Greenwich; and at the Beeston Observatory a hundred different forms were drawn: amongst the latter will be seen some very extraordinary Crystals; for diagrams of which see next page.

Figures 1 to 10 fell during a snow-storm on the 22nd. of January, after 9h. 30m. p.m. In this storm the Crystals most abundant were Nos. 1 and 8.

Figures 11 and 12 fell on the 23rd. of January, at 10 a.m.

Figures 13 to 17 on the 23rd. of January, at 3h. 30m. p.m. During this storm there were many very remarkable ones. Figure 14, whilst being drawn, partially melted and then froze again, assuming the form given in Figure 15.

Figures 18 and 19 occurred on January 26th. at 9 p.m. These flakes were three times as thick as those previously drawn, assuming more the appearance of lozenges. No. 18 was very common; it was solid.

Figure 20 occurred on February 3rd. at 9h. 45m. a.m. It resembled a thick piece of ice; very many similar to this crystal. When pressed between two *cold* pieces of paper, they split into three, the centre Crystal being double convex, and the two outer ones having one side convex and the other concave.

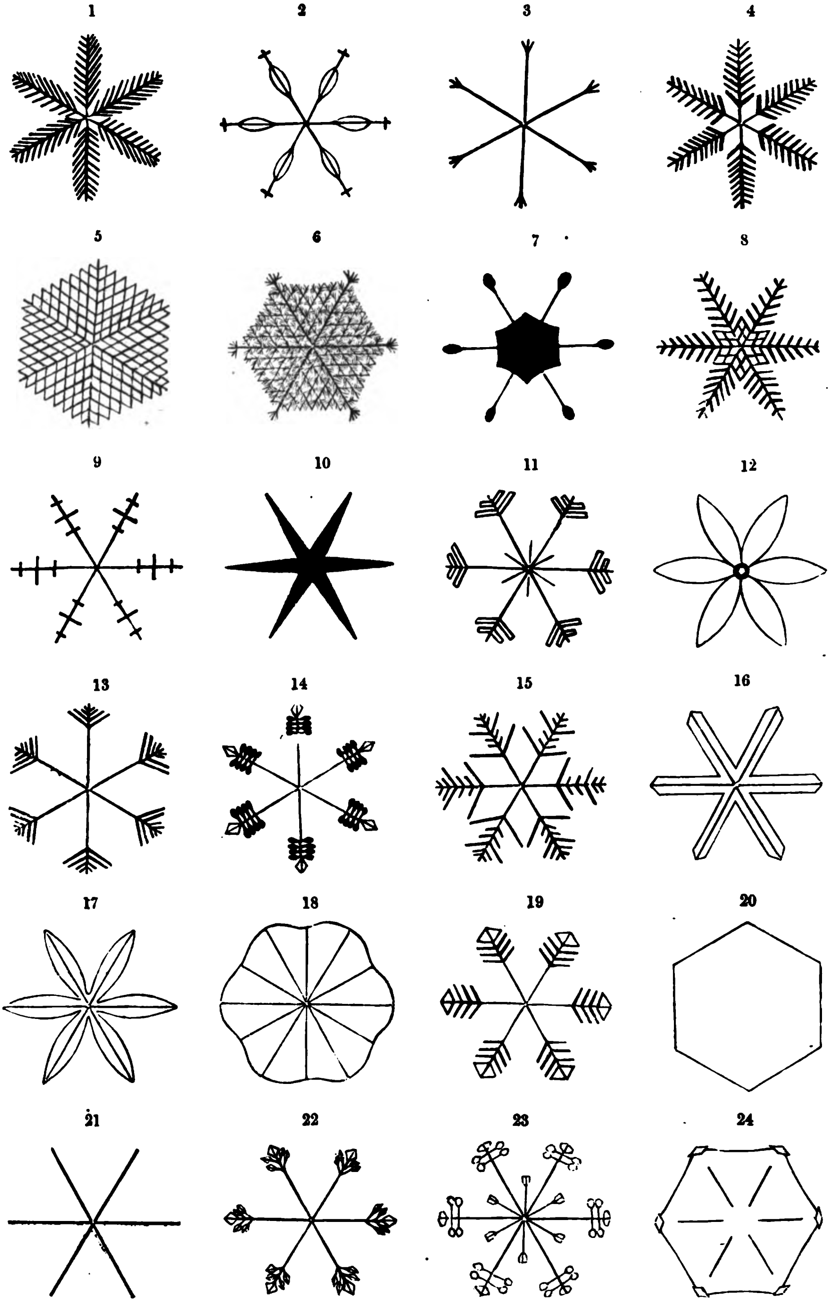
Figures 21, 22, and 23 fell on the 6th. of February, at 4 p.m.

Figure 24, on February 12th., at 9 a.m.

(To be continued.)

SNOW CRYSTALS.—Sketched at the Beeston Observatory, in 1855.

(MAGNIFIED.)



STATE OF THE WEATHER IN JULY, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY.

1st., dull. 2nd., dull. 3rd., fine. 4th., very fine. 5th., fine. 6th., fine. 7th., fine. 8th., fine. 9th., fine till 10 p. m., when rain fell, distant lightning, from 10 p. m. till midnight. 10th., lightning till 1 a. m., very misty morning, fine till three p. m., when a heavy thunder-storm occurred; evening overcast. 11th., fine. 12th., fine. 13th., fine, 1h. 30m. p. m. a solar halo, stratus in the valley in the evening, lightning in W., 11h. 14m. 30s., p. m., a large meteor. 14th., from 3 a. m. till 10 a. m., violent thunder-storms, fine afterwards. 15th., fine. 16th., overcast, rain from 11 a. m. till 6 p. m. 17th., showery. 18th., fine. 19th., rainy after 5 a. m., at 3 p. m. a thunder-storm, which lasted till 8 p. m. 20th., fine, 12h. 45m. p. m., loud clap of thunder. 21st., fine. 22nd., very fine. 23rd., fine, 3 p. m. distant thunder, from 5 p. m. till 10 p. m. much thunder and lightning, 8h. 15m., rain fell. 24th., rainy until 9 a. m., then fair. 25th., continued rain until 6 p. m. 26th., dull. 27th., fine, from 4 p. m. till 5 p. m. a thunder-storm, from 8 till 8h. 30m. p. m. a thunder-storm in SE. 28th., 5 a. m. a shower, fine. 29th., fine, but showers in the distance. 30th., fine. 31st., dull, rain from 11 a. m., till 3h. 30m. p. m.

Result of observations made at Highfield House, in July 1855:—

Mean height of the barometer, corrected and reduced to 32° F., (altitude of cistern above the sea level being 181 feet,) 29.720 inches.

Mean pressure of dry air, or that of the gases, 29.267 inches.

Elastic force of vapour, or mean pressure of the water contained in the air, 0.453 of an inch.

Excess or defect of the barometer in July 1855, from the mean pressure of the last eight years, 0.075 of an inch.

Mean pressure of July from 1847 to 1854, 29.795 inches.

Greatest height of the barometer, (reduced,) 30.038 inches, (on the 2nd.)

Least height of the barometer, (reduced,) 29.339 inches, (on the 16th.)

Range of the Barometer, 0.699 inch.

Mean temperature of the dry-bulb thermometer, corrected for diurnal range, 61.3°.

Mean temperature of the greatest heat and greatest cold of each day, corrected for diurnal range, 60.8°.

Adopted mean temperature, 61.0°.

Mean temperature of July from 1809 to 1852, 61.7°.

Mean temperature of July from 1847 to 1854, 61.3°.

Mean temperature of July from 1810 to 1820, 61.4°.

Mean temperature of July from 1820 to 1830, 61.4°.

Mean temperature of July from 1830 to 1840, 61.3°.

Mean temperature of July from 1840 to 1850, 60.6°.

Excess or defect of July, 1855, from the mean temperature of the last seven years — 0.3°.

Excess or defect of July, 1855, from the mean temperature of the last forty-two years — 0.7°.

Greatest cold of the night 45.2°, (on the 3rd.)

Greatest heat of the day, in the shade, 83.5°, (on the 23rd.)

Diurnal range of temperature, 38.3°.

Minimum temperature on grass, 38.8°, (on the 5th.)

Maximum temperature in sunshine, 99.5°, (on the 29th.)

Range of temperature between the greatest cold on grass, and the greatest heat in the sunshine, 60.7°.

Greatest amount of solar radiation, 24.4°, which occurred on the 29th.

Greatest amount of terrestrial radiation, 5.2°, which occurred on the 8th.

Mean temperature of the wet bulb thermometer, corrected for diurnal range, 58.3°.

Mean temperature of evaporation, 57.8°.

Mean temperature of the dew point, 55.7°.

Mean temperature of the dew point between 1847 and 1854, for July, 54.8°.

Excess or defect in 1855 of the mean dew point, + 0.9°.

Mean amount of ozone, 3.7.

Mean amount of ozone in the night, 2.9.

Mean amount of ozone in the day, 4.6.

Number of nights without ozone, 11.

Number of days without ozone, 2.

Mean amount of ozone with a west wind, 2.7.

Mean amount of ozone with a north-west wind, 4.6.

Mean amount of ozone with a north wind, 6.5.

Mean amount of ozone with a north-east wind, 4.5.

Mean amount of ozone with an east wind, 5.0.

Mean amount of ozone with a south-east wind, 3.3.

Mean amount of ozone with a south wind, 3.5.

Mean amount of ozone with a south-west wind, 3.6.

Amount of rain fallen twenty-five feet from the ground, 4.506 inches.

Amount of rain fallen two feet from the ground, 4.558 inches.

Average amount of rain in July, during the past eleven years, 2.9 inches.

Excess or defect in July, 1855, of the average fall of rain, + 1.6 inches.

Number of days on which rain fell, 13.

Amount of evaporation, 5.190 inches.

Average amount of evaporation in July, between 1848 and 1854, 6.6 inches.

Excess or defect in the amount of evaporation from the mean in 1855 — 1.4 inches.

Mean daily amount of evaporation, 0.167 of an inch.

Greatest amount of evaporation in twenty-four hours, 0.280 of an inch.

Least amount of evaporation in twenty-four hours, 0.046 of an inch.

Mean amount of cloud at 9 a.m., 8.7.

Mean amount of cloud at 10 p.m., 6.9.

Mean daily amount of cloud, 7.9.

Number of days overcast at 9 a.m., 16.

Number of days overcast at 10 p.m., 10.

Number of days cloudless at 9 a.m., 0.

Number of days cloudless at 10 p.m., 0.

Mean weight of vapour in a cubic foot of air, 5.1 grains.

Average mean weight of vapour in a cubic foot of air, between 1848 and 1854, 4.8 grains; excess or defect in 1854, + 0.3 grain.

Additional weight of vapour required to saturate a cubic foot of air, 1.0 grain.

Average additional weight of vapour required to saturate a cubic foot of air between 1848 and 1854, 1.2 grains; excess or defect in 1855, – 0.2 grain.

Degree of humidity, (complete saturation being 1.000,) 0.830.

Mean degree of humidity for July, from 1848 to 1854, 0.800; excess or defect in 1855, + 0.030.

Mean weight of a cubic foot of air, 522.8 grains.

Average mean weight of a cubic foot of air between 1848 and 1854, 525½ grains.

Excess or defect of the mean weight of a cubic foot of air in July, 1855, 2¾ grains.

Whole amount of water in a vertical column of the atmosphere 6.3 inches.

Average whole amount of water in a vertical column of the atmosphere for the last four years, 5.9 inches; excess or defect in July, 1855, + 0.4 of an inch.

(+ Is in excess of the mean, and — in defect of the mean.)

LARGE METEOR SEEN ON THE 3rd. OF AUGUST, 1855, AT BEESTON.

At 10h. 53m. Mr. Seagrave informs me that he saw a large meteor; the following is a sketch of its appearance and path:—

When first seen it was in SSW, at an altitude of 45°, it moved downwards in a curve to NNW, bursting at an altitude of 25°. During more than half its track it was a colourless, well-defined, circular body, brighter than the moon, and about a quarter the size of that luminary; a streak of light being left in its track. It then altered, was ill-defined on its edges, increased to double its original size, and became *intensely blue.* It disappeared suddenly, after having been visible two seconds.

A similar meteor to the one mentioned on page 28, was observed on Saturday evening at 8h. 30m. p m., in the SW, at Berkhampstead.

CALENDAR OF NATURE FOR JULY, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGAM.

BY THE EDITOR.

JULY 3rd.—Strawberries ripe, (Kean's seedling.) In 1854 they were ripe on June 14th.; 1853, 23rd.; 1852, 14th.; 1851, 25th.; 1850, 20th.; 1849, 24th.; 1848, May 31st.; 1846, June 6th. The mean time being June 16th., and the range twenty-six days. In 1855, they were seventeen days later than usual, and eight days later than had been recorded before.

3rd.—Wheat in flower; barley in flower; Acasia, (*Robinia pseudo-acacia,*) in flower. The Acasia was in flower in 1853, on June 24th.; 1848, 3rd.; 1850, 20th.; 1851, 25th. The mean time being June 18th. Thus in 1855 it was fifteen days later than usual, and eight days later than before recorded.

5th.—Elder, *(Sambucus nigra,)* in flower. In 1853, in flower June 30th.

5th.—*Viccia cracca,* and *Lathyrus pratensis* in full flower.

9th.—*Lonicera pubescens* in flower. In 1854, it was in flower on June 29th.; 1853, 24th.; 1852, 24th.; 1851, 22nd.; 1850, 16th.; and 1848, 11th. The mean time of flowering is June 21st., and the range in days eighteen. In 1855 it was eighteen days later than usual, and ten days later than before recorded.

9th.—Privet, *(Ligustrum vulgare,)* in flower. Spindle Tree, *(Euonymus Europæus,)* in flower.

10th.—Bastard Acorus, *(Iris pseudo-acorus,)* in flower. Portugal Laurel, *(Cerasus lusitanica,)* in flower. In 1853, in bloom June 26th.; 1852, July 7th,; and in 1850, June 26th.

12th.—British Queen Strawberry ripe.

13th.—Harebell, *(Campanula rotundifolia,)* in flower.

14th.—Black Prince Strawberry over.

17th.—Kean's Seedling Strawberry over.

18th.—Woody Nightshade, *(Solanum dulcamara,)* in flower. Very many moths about. A great scarcity of slugs.

20th.—Red and White Currants ripe. In 1852, ripe on the 7th.; 1851, 17th.; 1850, 17th.; 1849, 12th.; 1848, 15th.; 1846, 15th. The mean time being the 14th., and the range in days ten. In 1855, they were six days later than usual, and three days later than before recorded. The wet weather decaying all the British Queen Strawberries.

22nd.—Raspberries ripe. In 1854, ripe on the 4th.; 1853, 13th.; 1851, 15th.; 1850, 17th.; 1849, 12th.; 1848, 23rd. of June. The mean time being the 9th., and the range in days twenty-four. Thus in 1855, they were fifteen days later than usual, and five later than before recorded.

23rd.—Many mushrooms.

26th.—Very little hay yet stacked.

27th.—Great Mullein, *(Verbascum thapsus,)* in flower.

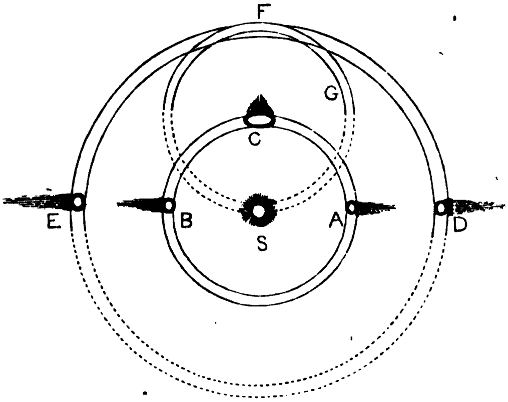
29th.—Barley changing colour. Perforated St. John's Wort, *(Hypericum perforatum,)* in flower.

31st.—The harvest much retarded by the wet weather, but little hay having been secured. The crop of apples, pears, and plums, will be very heavy; the corn crops look exceedingly promising, but the turnips have generally suffered considerably from the turnip fly.

REMARKABLE CIRCLES OF LIGHT SURROUNDING THE SUN, AND MOCK SUNS, SEEN AT THE BEESTON OBSERVATORY, APRIL 24TH., 1854.

At 5h. 45m. in the evening, a circle, ABC, of 23° radius, was formed round the sun, S.

At 5h. 48m., the upper half of another circle, DEF, of 45° radius, having the sun also for its centre, became visible, and at the same time, three mock suns were formed—A and B, situated on the sun's horizontal level, were very bright, having tails of 10° in length extending in an opposite direction to the sun. The third, C, situated at the apex of the circle ABC, was confused, but quite apparent; it had a short tail extending upwards.



At 5h. 50m., about 50° of a circle of about 23° radius, became visible. The centre of this circle was in the mock sun C. The base, if visible, would have passed through the true sun. The dotted portion was that part which was invisible.

5h. 57m.—Clouds rapidly floated over, and hid the phenomenon. At 6h. 20m. again visible, with the addition of two other mock suns, D and E; they had tails at least 15° in length.

The phenomenon finally disappeared at 6h. 40m., soon after which hour the sky became cloudless.

In the morning there had been a very sharp frost, which had cut the potatoes to the ground, and killed many of the young leaves of the beech and horse-chesnut.

RESULT OF OBSERVATIONS MADE AT THE BEESTON OBSERVATORY, IN JULY, 1855.

The greatest cold occurred on the 5th., the temperature descending to 42.2°; the greatest heat in shade on the 23rd., namely, 83.5°. The range of temperature for the month was 41.3°. The maximum heat rose to 81° on the 13th., and to 80° on the 12th. The greatest heat on the 25th. was only 59.1°. The warmest night was the 24th., the thermometer never falling below 57.6°. On the 16th., the greatest cold of the wet-bulb thermometer was 2.2° below that of the dry-bulb, and 2.3° on the 4th. It did not descend below that of the temperature of the air on the 21st., 26th., 27th., 28th., and 29th. The greatest heat of the wet-bulb thermometer was 13.8° below that of the dry-bulb thermometer on the 1st., 11.5° on the 12th.; and 10.2° on the 21st., whilst on the 19th. it was only 3° below. The amount of rain fallen, was:—

On the	10th.,	0.443	of an	inch.	On the	23rd.,	0.302	of an	inch.
"	14th.,	0.980	"	"	"	24th.,	0.158	"	"
"	15th.,	0.002	"	"	"	25th.,	0.579	"	"
"	16th.,	0.286	"	"	"	26th.,	0.009	"	"
"	17th.,	0.118	"	"	"	27th.,	0.172	"	"
"	19th.,	0.690	"	"	"	31st.,	0.291	"	"

Ozone in the night-time:—0 on the 25th.; 0.5 on the 21st.; 1 on the 10th. and 30th.; 1.5 on the 5th. and 23rd.; 2 on the 13th. and 22nd.; 2.5 on the 2nd., 3rd., 4th., 6th., 7th., 8th., and 16th.; 3 on the 15th., 18th., 19th., 20th., 24th., 28th., and 29th ; 3.5 on the 11th. and 14th.; 4 on the 1st., 9th., 17th., 26th., and 27th.; 5.5 on the 31st.; 6 on the 12th. Mean amount 2.8.

Ozone in the day-time:—0.2 on the 25th.; 1 on 1st. and 21st.; 1.5 on the 4th. and 6th.; 2 on the 8th., 10th., 13th., 18th., and 24th.; 2.5 on the 2nd.; 3 on the 14th., 16th., 20th., and 27th,; 3.5 on the 11th. and 12th.; 4 on the 3rd., 15th., 26th., 29th., and 30th.; 6 on the 5th., 9th., 17th., and 28th.; 7 on the 22nd.; 8 on the 23rd; 10 on the 7th., 19th., and 31st. Mean amount 4.0.

Solar halos occurred on the 8th., 10th., 13th., 23rd., and 24th.; and a lunar halo on the 31st. A white fog occurred in the valley on the 3rd., 4th., 5th., 6th., 7th., 8th., 13th., 18th., 22nd., 23rd., 27th., 28th., and 31st. On the 28th. at 12h. 50m. a.m., a ray of light was formed which passed vertically through the moon; above, it was 5° in length, and indistinct; below, it was 25′ in length, and very apparent. It lasted 10 minutes.

AMOUNT OF RAIN FALLEN AT HIGHFIELD HOUSE, IN JULY, DURING THE LAST TWELVE YEARS.

1844, . . .	1.4	inches,	1850, . . .	4.1	inches,
1845, . .	3.7	"	1851, . .	3.4	"
1846, . . .	2.8	"	1852, . . .	2.7	"
1847, . .	0.7	"	1853, . .	2.9	"
1848, . . .	3.4	"	1854, . . .	2.1	"
1849, . .	2.3	"	1855, . .	4.5	"

VIOLENT EARTHQUAKE IN SWITZERLAND.

On the 25th. and 26th. of July, according to the "Journal de Genéve," the country was visited by severe shocks of earthquake, being most violent on the 26th. At Grachen, at 10 o'clock a.m., a shock occurred which threw persons to the ground, thirteen barns fell in, the spire of the church was demolished, and an enormous rock, known as the Kalchenzag, was hurled from the mountain, falling with a terrible crash into Viège. At St. Nicolas, all the houses were thrown down. At 1 p.m. another shock; others at 1h. 15m. p.m., 2h. 10m., 2h. 14m., 2h. 30m., 3h. 40m., and 4h. 40m.; afterwards other shocks occurred.

'At Stalden nearly all the houses were shaken down; at Viège, at 10 o'clock, another violent shock; at Törbel and at Hurbücken, the roofs of the churches were driven in. The inhabitants have left the villages. On the 25th., the whole east of France from Valence to Metz, felt the earthquake. The clock of the cathedral at Grenobie stopped.

The earthquake was felt in Italy and Germany. The following towns felt the shocks:—Lyons, Lous-le-Saulnier, Besançon, Baume, Belvoir, Strasbourg, Dijon, Erbach, Odenwald, Carlsruhe, Friburg, Baden, Oberland, Stutgardt, Ravensburg, Esslingen, Plochingen, Milan, etc. The earthquake pendulum at the Beeston Observatory was not in the slightest degree affected by these shocks.

FALL OF RAIN IN JULY, 1855.

	Inches.
Arbroath.—A. Brown, Esq.	1.58
Newport, Isle of Wight.—J. C. Bloxam, Esq.	2.66
Manchester.—G. V. Vernon, Esq.	2.69
Uckfield.—C. L. Prince, Esq.	3.44
St. Paul's Parsonage, near Wigton, Cumberland.—Rev. F. Redford.	3.49
Isle of Man.—J. Burman, Esq.	3.53
Exeter.—C. H. Roper, Esq.	3.50
Holkham, Norfolk.—S. Shellabear, Esq.	3.63
Elgin, N. B.—Dr. Geddes.	3.82
Kendal.—S. Marshall, Esq.	4.05
Grantham.—J. W. Jeans, Esq.	4.14
Beeston Observatory.	4.00
Guernsey.—Dr. Hoskins,	4.28
Rose Hill, near Oxford.—Rev. J. Slatter,	4.52
Derby.—Mr. Davis,	4.80
Highfield House Observatory.	4.50
Bolton.—H. H. Watson, Esq.	5.04
Royston, Hertfordshire.—H. Wortham, Esq.	5.14
Gainsborough.—F. Dyson, Esq.	5.08
Enfield.—Rev. J. M. Heath.	5.66
Belvoir Castle.—W. Ingram, Esq.	6.16

	Inches.
Berkhampstead.	6.40
Romford, Essex.—C. Pearson, Esq.	5.54
Lampeter, Cardiganshire.—J. Mathews, Esq.	2.74
Boston.—T. Collis, Esq.	3.91
Leeds.—H. Denny, Esq.	2.82
Truro.—H. C. Hodge, Esq.	2.73

DIRECTION OF THE WIND, AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN JULY, 1855.

1st.—SSW till 8h. 45m. p.m., except from 4 a.m. till 5h. 30m. a.m., when SW; from 8h. 45m. p.m. S.

2nd.—Between SW and S until 10 a.m., then WNW till 2h. 30m. p.m., then WSW for half-an-hour. From 3h. 15m. p.m., wind between WNW and NNW for three hours; 6h. 30m. SSW. From 7 p.m. W and WNW.

3rd.—WNW till 10 a.m. then W.

4th.—W till 7h. 15m. a.m., then N and NE till 9h. 15m. p.m., then NW and NNW.

5th.—NNW till 4h. 30m., a.m., then N till 6h. 15m. a.m., then NE till 3h. 15m. p.m., then E.

6th.—E till 1h. 30m. p.m., then ESE and SE till 2h. 15m. p m., then SSW and SE till 2h. 45m. p.m., then ESE and E till 9h. 30m. then NE till 10h. 30m. p m., after which time N.

7th.—Became NE at 12h. 15m. a.m., and at 4h. 45m. became E and ENE.

8th.—E and ENE, except from 10h. 15m. a.m. till 8h. 15m. p.m., when SE and ESE.

9th.—NE and ENE.

10th.—NNE and ENE.

11th.—NNE till 6 a.m., then NW till 10 a.m., N till 4m. 30m. p.m., NE till 8 p.m., after which hour N.

12th.—N and NNW till 3h. 30m. a.m., then N and NNE till 10h. 30m. a.m., then NW; from 10h. 30m. till 10h. 45m. N, then NE for two hours; 1 p.m. N, 1h. 15m. ENE, then NE till 4 p.m., after which hour E.

13th.—E till 8h. 30m. a.m., then S and SW till 1 p.m., then W and WSW till 6 p.m., then WSW for fifteen minutes, after which hour W.

14th.—Very changeable; E till 1 a.m., then WNW for thirty minutes, then ENE till 3h. 15m. a.m., W till 4 a.m., NW till 5h. 15m. a.m., W till 5h. 30m. then E till 5h. 45m., then passed through S to W, became ENE at 6 a.m., SE at 8 a.m., then ENE for fifteen minutes, then E till 1 p.m., when the wind moved through N to WSW remaining SW and WSW.

15th.—WSW till 4 a.m., then W.

16th.—W till 7h. 45m. a.m., then S and SSE till 9 a.m., then SSW and SW for thirty minutes; S and SE till 12h. 15m. p.m., (except from 10h. 45m. a.m. till 11h. 45m. a.m. SW,) then SW and WSW till 1 p.m., after which WNW till

6 p.m., then W.

17th.—W all day.

18th.—W and WNW.

19th.—W till 5h. 15m. a.m., then changeable, being SW till 5h. 30m., SSW till 5h. 45m., SSE till 6h. 30m., SW till 7 a.m., S till 7h. 15m., ESE till 7h. 30m., SE till 7h. 45m., SW till 8 a.m., S till 8h. 15m., SSE till 8h. 45m., S till 9h. 15m., SW till 9h. 30m., SSE till 9h. 45m., S and SSW till 2h. 15m. p.m., WSW till 5 p.m., SW till 5h. 45m., WSW till 6 p.m., after which hour W.

20th.—W till 6h. 15m. a.m., then WNW till 10h. 15m. p.m., then NW fifteen minutes, N for fifteen minutes, after which W.

21st.—W and WSW till 8h. 30m. a.m., then S till 8h. 45m., then SW till 11h. 30m. a.m., then WNW for thirty minutes, then SW and WSW.

22nd.—SW till 3h. 15m. p.m., then W for an hour, then WSW till 11h. 15m. pm., then W.

23rd.—W and WNW till 7h. 30m. a.m., SSW till 8h. 45m. a.m., S for fifteen minutes, then SE for fifteen minutes, then E and ESE till 10 a.m., then SE till 2 p.m., (except at 12h. 45m. p.m. and 1h. 30m. p.m. when S,) then ESE till 4h. 30m. p.m., then E till 6 p.m., after which hour constant changes.

24th.—Changeable till 1 a.m., then S till 6h. 30m. a.m., when SW. From 6h. 45m. a.m., WSW till noon, then W till 1h. 45m., then WSW and SW till 2h. 30m., then W for fifteen minutes, then SSW till 4h. 30m. p.m., SE for thirty minutes, SW for fifteen minutes, S for fifteen minutes, then SSW and SW.

25th.—WSW till 7h. 45m. a.m., then SW till 9h. 30m. a.m., W for fifteen minutes, S for fifteen minutes, then SW till 11h. 15m. a.m., then W till 6h. 30m. p.m., then SW for fifteen minutes, and S for an hour, then SW.

26th.—SW till 5h. 45m. a.m., then SSW for fifteen minutes; SSE till 2h. 30m. p.m., S till 5h. 30m., SW till 7h. 15m., S for forty-five minutes, then SW till 9h. 30m., then veered to E. From 10 p.m. ESE, till 11h. 15m., then SE for fifteen minutes, then S.

27th.—S till 3h. 45m, a.m. then SSE till 4h. 30m. a.m., then E till 8h. 15m. a.m., when S; at 8h. 30m. a.m. became SW, at 1h. 30m. p.m. SSW, at 2h. 45m. WSW, at 4 p.m. SW, at 4h. 15m. S, at 4h. 30m. W, at 8h. 15m. WSW, at 8h. 30m. SW, 8h. 45m. SSW, after 9h. 45m. p.m. SW.

28th.—SW and WSW till 8h. 15m. a.m., then W till 7h. 15m. p.m., then WNW and NW till 8h. 30m., then NNW for fifteen minutes, N for fifteen minutes, NE for forty-five minutes, N and NNW for thirty minutes, after which NW and WNW.

29th.—WNW till 7 a.m., then WSW till 10 a.m., then SW till 11h. 30m. a.m., W till 1h. 45m. p.m., then NW.

30th.—WNW till 3 a.m., then WSW till 7h. 45m., a.m., then SW till 1h. 15m. p.m., S for a few minutes, then SE, and then E, being ESE from 2 p.m. till 4h. 45m., then SW till 8 p.m., then SSW till 9h. 15m., when SSE., 9h. 30m. S, and continuing in S.

31st.—S till 2 a.m., then SSW till noon, then S till 2 p.m. then SW and WSW, becoming W at 2h. 30h. p.m., and continuing in that quarter.

On the 1st. the wind oscillated till 6 p.m., then steady; began to oscillate again at 4 a.m. on the 2nd., nearly steady after 7 p.m. 3rd.—Gentle oscillations, becoming greater after 2 p.m. 4th.—Nearly steady till 9 a.m., then oscillated till 10 p.m., then steady. 5th.—Steady till 8 a.m., then gentle oscillations.

6th.—Nearly steady. 7th.—Steady till 7 a.m., after which gentle oscillations. 8th. and 9th.—Gentle oscillations. 10th.—Oscillations. 11th.—Great oscillations, reaching E and W, from 7 a.m. till 4 p.m. 12th.—Oscillated. 13th.—Calm till 9 a.m., then oscillated till 7 p.m., then again steady. 14th.—Steady till influenced by thunder-storms, when several very great changes took place; at 7 a.m. began to oscillate. 15th.—Oscillated till 7 p.m., then steady. 16th.—Gentle oscillations. 17th.—Oscillated. 18th.—Small oscillations till 8 p.m., then steady. 19th.—Steady till 8 a.m., then oscillated, changes in thunder-storms at 4 p.m., and till 8h. 30m. p.m., then gentle oscillations. 20th.—Oscillated. 21st.—Oscillated till 4 p.m., then steady. 22nd.—Oscillated till 4 p.m., then steady. 23rd.—Steady till 11 a.m., then oscillations; great changes from 7 a.m. till 7 p.m., then oscillations. 24th.—Oscillated. 25th.—Gentle oscillations till 9 a.m., then greater till 7 p.m., after which tolerably steady. 26th.—Steady till 6 a.m., then oscillated till 7 p.m., then steady. 27th.—Steady till 9 a.m., then oscillated. 28th.—Oscillated. 29th.—Oscillated till 8 p.m., then steady. 30th.—Nearly steady till 5 a.m., then oscillations. 31st.—Oscillations.

FORCE OF THE WIND IN JULY, 1855, AS RECORDED BY THE ATMOSPHERIC RECORDER.

1st.—Calm till 5h. 30m. a.m., then windy, being a pressure varying from 4 oz. to 1½ lb.; after 1h. 15m. p.m., a breeze of 4 oz., calm after 6 p.m.

2nd.—Calm, except a breeze of 4 oz. from 3h. 45m. p.m., for thirty minutes.

3rd.—Calm till 9 a.m., then a breeze varying from 3 to 7 oz., calm after 8 p.m.

4th.—Calm till 7h. 30m. a.m., then a breeze of from 1 oz. to 7 oz. till 9h. 30m. p.m., then calm.

5th.—Calm till 11h. 15m. a.m., then a breeze of 1 to 3 oz.

6th.—Calm, except from 12h. 30m. p.m. till 5 p.m., when a pressure of 1 oz.

7th.—Calm except from noon till 7 p.m., when 1 oz. pressure.

8th.—Calm till 10h. 15m. a.m., then a breeze of from 1 to 5 oz. till 10 p.m., then calm.

9th.—Calm till noon, then a pressure of from 1 to 5 oz.

10th.—Calm, except 4 oz. pressure at 3h. 45m. p.m., and 7 oz. at 5 p.m., and 4 oz. after 9h. 30m. p.m.

11th.—Calm till 8h. 15m. a.m., then a pressure of 4 oz.; after 6h. 30m. p.m., mostly calm.

12th.—Calm till 1 p.m., then 1 oz. pressure till 9h. 45m. p.m., after which hour again calm.

13th.—Calm till 1 p.m., then pressure of one to 3 oz. till 7 p.m., then calm.

14th.—Calm till 5 a.m., then 3 oz. pressure for forty-five minutes, then again calm till 2h. 15m. p.m., when a pressure of 1 to 4 oz. till 4h. 45m. p.m., then calm.

15th.—Calm till 5h. 45m. a.m., then a pressure of 1 to 3 oz. till 7h. 45m. a.m., then 4 oz. till 10 a.m., then 7 to 9 oz. till 11h. 30m. a.m., then 4 to 6 oz. till 3 p.m., 1 oz. till 3h. 45m. p.m., then calm.

16th.—Calm.

17th.—Pressure of 1 oz. till 6 a.m., then 4 oz. till 6h. 30m. a.m., then 7 oz. to 1¾ lb. till 2h. 30m. p.m., then 2 to 4 oz. till 3h. 45m. p.m., then 4 oz. to 1½ lb. till 8 p.m., then 2 to 3 oz.

18th.—4 oz. till 3 a.m., then 1 oz. till 6h. 30m. a.m., then 3 to 5 oz. till 9 a.m., then 7 oz. to 1¼ lb. till 11h. 30m. a.m., then 2 to 4 oz. till 4 p.m., then calm.

19th.—Calm till 7h. 30m. a.m., then 1 oz till noon, then 4 oz. till 1h. 30m. p.m., then ½ lb. to 1½ lb. till 2h. 45m. p.m., then 1 oz. till 9 p.m., then 3 oz.

20th.—3 to 6 oz. till 5 a.m., then 7 oz. to 1¼ lb. till 7h. 30m. a.m., then 1½ lb. till 10 a.m., hen 1½ to 2¼ lb. till 6 p.m., 3 to 7 oz. till 8 p.m., then 1 oz.

21st.—Calm till 10h. 45m. a.m., then 1 oz. till 9 p.m., then calm.

22nd.—Calm till 3 p.m., then 1 oz. till 9 p.m., then calm.

23rd.—Calm till noon, then 1 oz. till 7h. 45m. p.m., then 1¼ lb., at 8h. 15m. p.m. 6 oz., 8h. 30m. p.m. 3 oz., then 1 oz.

24th.—Calm till 6h. 30m. a.m., then 1 to 3 oz. till 7h. 45m. a.m., then 4 to 6 oz. till 9h. 45m. a.m., then 5 to 8 oz. till noon, then 4 oz. for half an hour, then 1 oz. till 3h. 15m. p.m., then 2 to 4 oz. till 3h. 45m. p.m., then 1 oz. till 5 a.m., then 4 to 6 oz. till 6 p.m., then 1 oz till 8 p.m., then calm

25th.—Calm till 9 a.m., then 3 oz. till 10 a.m., then 1 oz. till 12h. 30m. p.m., then 4 oz. till 2h. 15m. p.m., 1 oz. till 4h. 30m. p.m., 4 oz. till 6 p.m., then 1 oz.

26th.—1 oz. till 10 a.m., then 1 to 4 oz. till noon, then 1 oz. till 2h. 30m. p.m., 2 to 4 oz. till 3 p.m., 1 oz. till 7 p.m., then calm.

27th.—Calm till 9h. 30m. a.m., then 1 to 3 oz. till 4h. 30m. p.m., when in a thunder-storm a breeze of 1 lb. 9 oz. suddenly sprung up; at 4h. 45m. p.m. 1¼ lb., 5 p.m. till 10h. 15m. p.m. 1 oz., except at 7h. 30m. p.m., when ½ lb., from 10h. 30m. p.m. calm.

28th.—Calm till 7 a.m., then 1 to 5 oz. till 5 p.m., then 1 oz. till 8 p.m., then calm.

29th.—Calm till 11 a.m., then 1 to 4 oz. till 5 p.m., then 1 oz. till 9 p.m., then calm.

30th.—Calm.

31st.—Calm till 1h. 45m. p.m., then 1 oz. till 3 p.m., then 2 oz. till 5h. 45m. p.m., 6 p.m. ½ lb., then 5 oz. for half an hour, then 1 oz. till 11 p.m., then calm.

ELECTRICITY AT THE BEESTON OBSERVATORY, DURING JULY, 1855.

1st.—Positive; feeble.

2nd.—Positive; feeble.

3rd.—Positive; feeble.

4th.—Positive; feeble, at 2 p.m. rather stronger.

5th.—Negative; feeble, became positive at 2 p.m.

6th.—Positive; feeble.

7th.—Positive; feeble.

8th.—Positive; feeble.

9th.—Positive; feeble, distant lightning at night.

10th.—Negative; feeble. After 10 a.m., positive, and tolerably strong. 2h. 40m. p.m., negative, the gold leaves striking the sides, soon became positive, and the pith-balls expanded: thunder. 3h. 30m. p.m., thunder clouds in WNW and NE, constant thunder in N from a storm moving in an ENE current. At 4h. 30m., low clouds moved rapidly in NNE, current passed overhead, and when within 50° of the horizon they turned round and came back again in a SSW current *towards the storm;* they continued to do this for twenty minutes, (on several other occasions the same phenomenon has been observed.) At 4h. 50m., lightning about twice in a minute, thunder loud, apparently heavy rain falling in NE and E at about four miles off. 5h. 22m., rain, storm moving in an E current, and the S edge only passing over this place. 5h. 32m., fair, distant thunder until 7 p.m., the rain fell heavily at Nottingham for two hours, and NE of Nottingham was very violent, the rush of water doing great damage to the crops; houses were flooded and a wall washed down. After 11 p.m., Electricity feeble and negative.

11th.—Positive; feeble.

12th.—Positive till 10h. 15m. a.m., then negative. From 2 p.m. positive. After 11 p.m., negative, tolerably strong.

13th—1 a.m., negative. 10 a.m., no Electricity. 1h. 30m. p.m., negative, feeble. 11 p.m., positive, feeble.

14th.—From 3h. 30m. a.m., till 9h. 30m., Electricity very powerful, the Electrical bells ringing from 5 a.m. till 9h. 30m. a.m., and nearly half-inch sparks could be drawn from the exploring wires, the Electricity constantly changing from positive to negative. At 3h. 30m. a.m., a thunder-storm passed over us with heavy rain, vivid and near lightning, which was *blue,* about one flash in every ninety seconds. The rain commenced at 3h. 42m., lightning about eleven hundred yards off, thunder rolling from forty to seventy seconds. Between 3h. 45m. and 4h. 5m., two flashes within seven hundred and fifty yards, and eight others within fifteen hundred yards. The storm moved in a SW current, and lasted till 4h. 10m. a.m. At 5h. 25m. a very violent storm commenced, which also moved in a SW current. From 5h. 35m. a.m., above a quarter of an inch of rain fell in five minutes. The lightning intensely blue, exceedingly vivid and very frequent. Between 5h. 28m. and 6h. 10m., about one hundred and eighty flashes occurred, three were within two hundred and fifty yards, and thirty within seven hundred and fifty yards. Rain ceased at 6h. 10m., and the lightning became more distant. At 8h. 16m. a.m., rain again fell heavily, and lightning nearer. The most vivid flash occurred at 8h. 37m.; it struck a chimney a quarter of a mile W of this Observatory, the fluid passing down the interior, displacing many bricks. At 9h. 31m., hail. 9h. 35m. a.m., fair. Thunder till 10 a.m., 0.970 of an inch of rain fell. From 3 till 5 p.m., occasional thunder in E and NE.

15th.—Negative; feeble. 11 p.m., positive.

16th.—Positive. From 11 till noon active; then feeble.

17th.—Positive; feeble.

18th.—Positive; feeble.

19th.—Negative, strong, pith-balls expanded. At 11 a.m. became positive, and less powerful. 2 p.m., thunder in WSW. At 2h. 30m., rain commenced, and vivid lightning, about two flashes in a minute. At 2h. 59m., a flash five hundred and sixty yards off. Rain ceased at 3h. 15m. p.m., storm moved in SW current. 6 p.m., thunder in W. At 6h. 15m., very heavy rain for fifteen minutes, Electricity powerful, the pith-balls striking the sides of the Electrometer, and the recording discs in action. The Electricity negative until 6h. 35m., then positive, except for a few seconds half a dozen times, about forty-six flashes occurred, six flashes were very near. The lightning was *blue*. The storm moved in a WSW current. The recorder wrote down Electricity from 2h. 30m. p.m., till 3h. 15m., and again from 6h. 15m. p.m. till 7 p.m.

20th.—Positive, and rather feeble. Became negative at 10 a.m. Was positive at 11 p.m.

21st.—Positive; feeble.

22nd.—Positive till 10 a.m., then negative. 11 p.m., positive.

23rd.—Positive; feeble. From 4 p.m. active. From 7 till 9h. 30m. p.m. powerful. 11 p.m., very little. 5 p.m., thunder in W. From 6 p.m. constant thunder from a storm moving from WSW to NW; in a SSE current. From 8 p.m. lightning constant and vivid, and *intensely scarlet* in colour, the nearest flash being fourteen hundred and sixty yards off. The northerly edge *only* of this storm passed over us; it was very violent at Loughborough and Derby. No lightning after 9h. 6m., until 11h. 30m. p.m., when distant in S and E all night.

24th.—Positive; feeble.

25th.—Negative; powerful, pith-balls expanded. 12h. 30m. p.m., positive. 2h. 30m. p.m., again negative. 3 p.m., positive and feeble.

26th.—Positive; feeble.

27th.—Positive; feeble, except from 4 till 5 p.m., and from 8 till 8h. 30m. p.m. when strong. 4 p.m., storm rising in S. 4h. 20m. till 4h. 30m., heavy rain, the storm small until it had passed over us, then rapidly increased in size; it first moved in SSW current, and then in SW current. When five miles NE of us very frequent lightning. From 8 till 8h. 30m. p.m., a storm moved in SW current, SE of us vivid lightning. Electricity constantly positive during the storms.

28th.—From 1 a.m. negative, and rather feeble. 8 p.m., thunder in NE, distant. 11 p.m., positive.

29th.—9 a.m., positive. 10 a.m., negative. 1 p.m., positive. 1h. 15m., p.m., negative. 11 p.m., positive; rather feeble.

30th.—Negative till 9 a.m., and rather feeble, then positive and less in amount.

31st.—Positive and feeble.

ZOOLOGICAL SOCIETY OF LONDON.

At the monthly meeting held on the 2nd. of August, Sir G. Clerk, Bart., in the chair, the following persons were elected members:—The Earl Vane, Lord Ravensworth, Sir M. W. Ridley, Bart., E. C. Taylor, Esq., F. S. Gosling, Esq., W. H. Martin, Esq., J. Browning, Jun., Esq., Major Hepburn, Mrs. Richardson, and Miss Wray. Among the additions to the Society, the Council reported the purchase of the Swan Goose of Northern Australia, (*Anseranas Melanoleuca.*) They are the first pair of these birds that have been brought to Europe.

ROYAL ASTRONOMICAL SOCIETY.

In No. 5, of the monthly notices of this Society, of the present year, is an interesting paper by Sir John Herschel. That astronomer urges upon the different observers to commence a regular series of photographic images of the sun, to be made daily, weather permitting, in order that the solar spots may be more accurately recorded.

An important paper "On the Constitution of the Atmosphere, upon which Laplace's Table of Astronomical Refractions is founded," by Sir J. W. Lubbock, Bart., F.R.S. The author gives a comparison between the calculations of Laplace, Ivory, and himself, from which we quote the following:—

According to Laplace.

At the earth, with a pressure of 29.94 inches, a temperature at 32° F., and the density of the atmosphere considered as 1.00000.

	Calculated Pressure.	Calculated Temperature.	Calculated Density.
At 5 miles,	9.60 inches,	— 60.2	0.34709.
10 "	2.54 "	— 111.2	0.11743.
15 "	0.60 "	— 120.0	0.02937.
20 "	0.13 "	— 139.7	0.00674.

According to Lubbock.

At the earth with a pressure of 30.00 inches, a temperature of 50° F., and a density considered as 1.00000.

	Calculated Pressure.	Calculated Temperature.	Calculated Density.
At 5 miles,	10.41 inches,	— 30.6°	0.41403.
10 "	2.81 "	— 126.4	0.14499.
15 "	0.45 "	— 240.6	0.03573.
22.33	0.00 "	— 448.0	0.00000.

According to Ivory.

Pressure at the earth, 30.00 inches; temperature, 50° F.; density considered as 1.00000.

	Calculated Pressure.	Calculated Temperature.	Calculated Density.
At 5 miles,	10.47 inches,	— 16.2°	0.40230.
10 "	3.25 "	— 45.8	0.13407.
15 "	0.95 "	— 56.2	0.04044.
20 "	0.28 "	— 59.4	0.01175.
30 "	0.02 "	— 60.6	0.00097.

These calculations are necessarily surrounded by great difficulties, owing to our imperfect knowledge of the law of decrease in temperature at different elevations. It will be seen that at 15 miles high, Laplace considers the temperature of the air to be 120° below zero; Sir John Lubbock, 240.6° below zero; and Ivory, 56.2° below zero. At 20 miles high, Laplace places the pressure at more than a tenth of an inch; Ivory, at nearly three-tenths of an inch; and Lubbock, at 22⅓ miles, considers that no atmosphere exists.

In No. 6, of these "Notices," is the announcement of the discovery of a small telescopic Comet on the 11th. of April, by Dr. Schweizer, at Moscow.

In No. 7 of the "Notices," Professor Argelander describes a new variable star in the constellation *Canis minor*, which he proposes to call *R. Canis minoris*.

In No. 8 of the Monthly Notices, the last issued to the Fellows of the Society, is an account of the monthly meeting held on the 8th. of June, M. J. Johnson, Esq., president, in the chair. The following persons were then duly elected Fellows:—Lieutenant Tennant, Bengal Engineers, India; the Rev. S. Newth, New College, London; and Captain W. Noble, R.A., of Woolwich.

Dr. Donati announced his discovery of a new Comet in the constellation *Telescopium Herschelii*, on the 3rd. of June, at the Observatory, Florence. The Comet exhibited no trace either of a tail or of a nucleus. It appeared rather fainter than the nebula in *Hercules*.

The Report of the Astronomer Royal to the Board of Visitors, read at the annual visitation of the Royal Observatory, Greenwich, 1855, June 2nd. This report describes the work accomplished at Greenwich during the previous year.

"On Celestial Day Observations," by Thomas Dick, Esq., L.L.D. Dr. Dick urges Astronomers to examine the heavens in the day-time in the neighbourhood of the sun, expressing a belief that a planet would be discovered within the range of 36 millions of miles from the sun, that is, nearer that luminary than Mercury, and that it might be detected if only half the size of Mercury,

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GEOLOGICAL SOCIETY.

At the last Annual General Meeting of the Geological Society, (W. J. Hamilton, Esq., F.R.S, president, in the chair,) from the report of the council, we learn that thirty-four new Fellows were elected. At the end of 1853, the members numbered eight hundred and seventy one, and at the close of 1854, eight hundred and eighty-four, being an increase of thirteen.

The Wollaston medal was awarded to Sir Henry de la Beche, C.B., F.R.S., for his valuable contributions to Geological Science; and the balance of the proceeds of the Wollaston Donation Fund to Dr. Guido Sandberger and Dr. Fridolin Sandberger, of Wiesbaden, for their important work on the Fossils of the Rhenish Palœozoic rocks, in Nassau.

During the year sixteen members have died; one honorary member, and one foreign member.

First on the list of deceased Fellows occurs the name of the late president, Professor Edward Forbes, F.R.S., who, although dying a young man, has left a monument in his works which will carry his name down to posterity. He was one of the most distinguished naturalists of the day; and his death is deplored by all men of science. As a personal friend, the Editor feels a satisfaction in stating that his loss to science is universally felt; whilst to those who had the honour and pleasure of his acquaintance, a valued and esteemed friend has been lost.

Sir John Franklin, F.R.S., the great arctic explorer is amongst the names of the deceased.

Professor Jameson, of Edinburgh, a very distinguished naturalist; Arthur Aikin, Esq., F.G.S., F.L.S., one of the founders of the Geological Society, and well known for his knowledge of chemistry.

Dr. Stanger, the able naturalist of the ill-fated Niger expedition.

The Rev. H. M. de la Condamine, an active Geologist.

James Hall, Esq., the Rev. Thomas Egerton, G. W. Aylmer, Esq., W. Winterbottom, Esq., Mr. Scorbie, and Sir T. Frankland Lewis, are a great loss to the Society.

The only Foreign Associate who has died during the year is Dr. Gotthelf Friedrich Fischer de Waldheim, Professor of Natural History in the University of Moscow.

Amongst the papers read and printed in the last Quarterly Journal, are several on "Fossiliferous drifts," by W. Prestwick, Jun., Esq., F.R.S. The first on a drift near Salisbury. In this drift Mr. Prestwick found bones of an Ox, (*Bos longifrons,*) the Red Deer, (*Cervus elaphus,)* of the Elephant, and of the *Tichorhine,* (Two-horned Rhinoceros.)

Amongst the Fossil Shells were—

Helix arbustorum,
" pygmæa,

Helix radiatula,
" pulchella,

Helix rufescens,
" fulva,
" hispida,
Pupa muscorum,
Zua lubrica,
Carychium minimum,
Limax agrestis,
Acme lineata,
Valvata piscinalis,*
Succinea putris,*
Ancylus fluviatilis,*
Limnæus truncatulus,*
" pereger,*
Pisidium amnicum,*
" pulchellum,*
" pusillum.*

The second paper on a Fossiliferous deposit in the gravel at West Hackney. Here the following Shells were obtained:—

Bithinia tentaculata,*
Valvata piscinalis,*
Limnæus palustris,*
" truncatulus,
" glaber,*
" stagnalis,*
Succinea putris,*
Planorbis marginatus,*
" spirorbis,*
" nautileus,*
Clausilia sp—
Carychium minimum,
Zua lubrica,
Pupa muscorum,
Helix pulchella,
" aculeata,
" hispida,
Zonites radiatulus,
" nitidus,
" crystallinus,
Pisidium pulchellum,*
" obtusale,*
" pusillum,*

In these papers the list of Shells enumerated all exist at the present time in Great Britain; those marked thus, * are Fresh-water species, whilst those not marked are Land Shells.

An interesting paper was read by R. G. Austen, Esq., F.R.S., on "Land Surfaces *beneath* the Drift Gravel."

A paper on "A Modern submerged Forest, at Fort Lawrence, Nova Scotia," by J. W. Dawson, Esq., F.G.S., is very interesting; all the stumps and trunks of trees were those of the Beech, *(Fagus ferruginea,)* and the Pine, *(Pinus strobus.)*

Professor Owen gives an account of some new Reptilian Fossils from the Purbeck beds, near Swanage, and of a new species of an extinct genus of Dibranchiate Cephalopod, (*Coccotenthis latipinnis,*) from the Upper Oolite Shales at Kimmeridge.

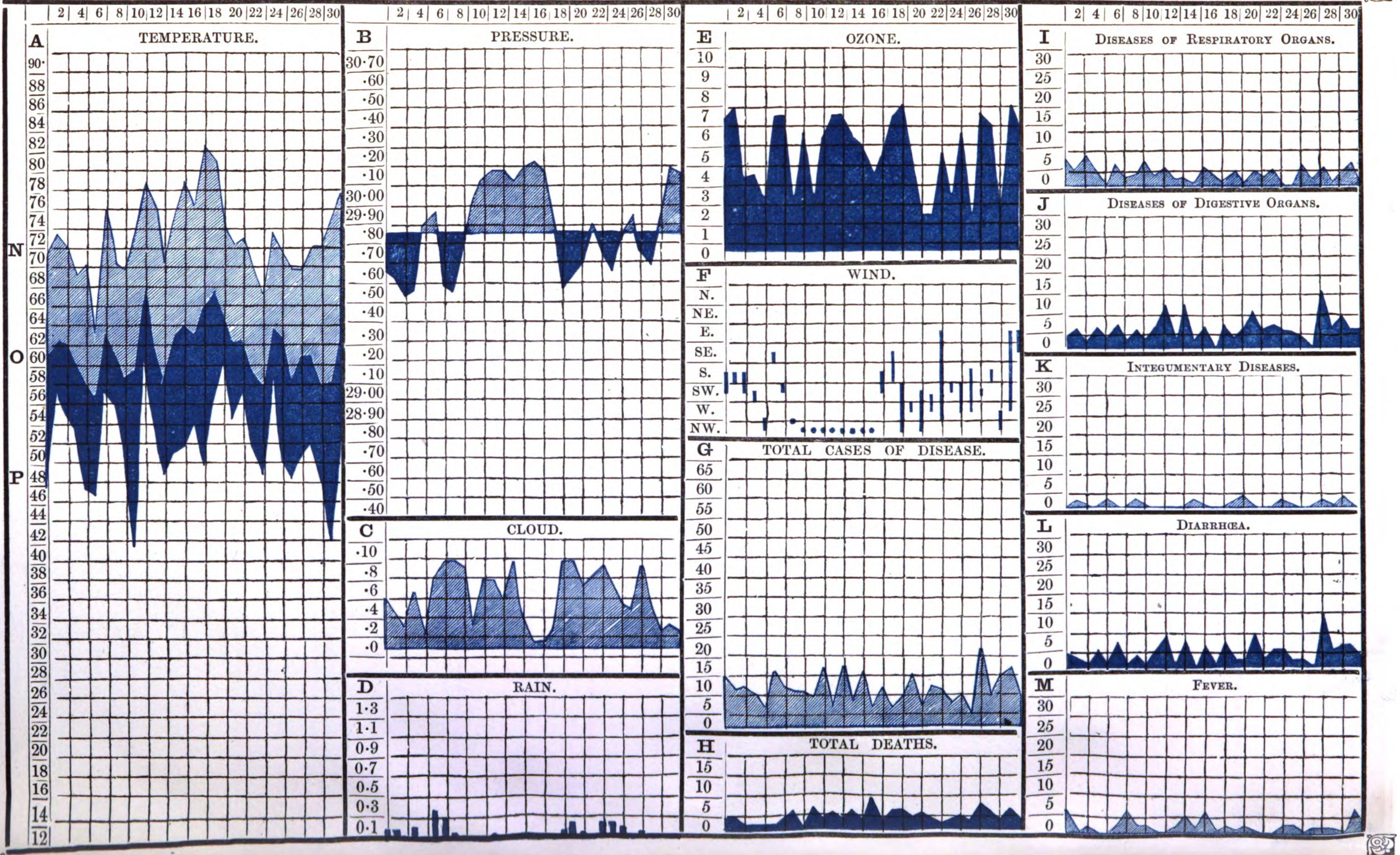
A long paper by W. J. Hamilton, Esq., F.R.S., President of the Geological Society, on the Tertiary Formations of the North of Germany, is a valuable addition to our Geological knowledge.

METEOROLOGICAL TABLE FOR JULY, 1855,

FROM OBSERVATIONS RECORDED AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

Day of the Week.	Day of the Month.	Mean Pressure of the Barometer.	Temperature of the Air.					Force of Wind.	General Direction of the Wind.	Amount of Ozone.		Amount of Rain.	Amount of evaporation	Temp. of evaporation
			Highest.	Lowest.	Range.	Lowest on Grass.	Adopted Mean.			In the night.	In the day.			
		Inches.	Deg.	Deg.	Deg.	Deg.	Deg.	0--6		0--10	0--10	Inches.	Inches.	Deg.
S	1	29.952	70.6	53.0	17.6	47.9	62.8	0.5	W. & SSW.	7	5		0.220	57.9
M	2	30.026	73.5	57.2	16.3	58.8	63.1	0.5	S. & NW.	0	1		0.150	59.6
T	3	.012	73.1	45.2	17.9	40.6	60.5	0.5	WNW. & NW.	0	3		0.115	56.7
W	4	29.996	69.2	55.7	13.5	54.5	60.5	0.3	N. & NE.	4	5		0.180	54.8
T	5	.941	74.8	45.2	29.6	38.8	58.4	0.7	NE. & E.	4	7		0.210	55.1
F	6	.915	75.0	54.0	21.0	50.3	60.7	0.3	E.	6	1		0.218	58.3
S	7	.936	75.3	50.4	24.9	44.8	59.2	0.4	E.	2	7		0.120	57.4
S	8	.805	78.9	49.7	29.2	42.6	63.0	0.4	ESE. & E.	4	6		0.230	58.0
M	9	.599	71.3	51.3	20.0	46.8	58.9	0.5	E.	7	8		0.280	56.7
T	10	.556	73.8	54.9	18.9	52.0	60.9	0.4	E. & N.	2	9	0.524	0.194	60.0
W	11	.549	70.6	57.0	13.6	55.9	60.4	0.4	NNW.	6	7	0.085	0.205	58.1
T	12	.688	79.3	57.8	21.5	54.6	63.1	0.2	NNW. & E.	8	5		0.132	59.2
F	13	.792	79.7	49.2	30.5	48.0	64.8	0.2	ESE. & W.	3	3		0.175	61.1
S	14	.695	71.2	55.8	15.4	52.4	60.3	0.4	E. & SW.	3	5	1.060	0.278	58.6
S	15	.676	74.0	54.5	19.5	50.8	63.3	0.6	W. & S.	0	2		0.130	59.4
M	16	.388	65.8	51.6	14.2	54.0	57.0	0.2	SSE. & NW.	6	7	0.304	0.184	54.8
T	17	.429	65.3	45.3	20.0	43.0	55.4	0.9	WNW. & W.	0	7	0.133	0.048	52.7
W	18	.552	69.8	52.1	17.7	50.3	59.9	0.7	W.	0	1.5		0.125	56.2
T	19	.406	63.6	52.5	11.1	49.8	55.7	0.5	S. & W.	5	7	0.679	0.164	52.5
F	20	.684	68.7	51.9	16.8	45.7	59.3	0.9	W. & WNW.	2	1	0.078	0.123	54.8
S	21	.952	77.4	46.0	31.4	41.8	61.8	0.2	SSW.	0	4		0.212	57.2
S	22	.986	77.1	56.9	20.2	52.5	66.6	0.1	WSW. & W.	0	6		0.248	63.2
M	23	.727	83.5	58.4	25.1	55.0	67.5	0.2	ESE. & W.	0	0	0.140	0.145	65.8
T	24	.478	71.7	60.0	11.7	58.2	62.5	0.2	WSW. & S.	0	1	0.180	0.234	61.4
W	25	.551	60.3	55.0	5.3	53.0	55.7	0,4	SSW. & S.	0	0	0.892	0.222	54.6
T	26	.611	67.1	51.6	15.5	50.2	58.9	0.3	SSE & ESE.	5	6	0.004	0.046	56.0
F	27	.645	71.5	52.2	19.3	48.6	59.4	0.5	SSW. & SW.	2	6	0.089	0.083	57.1
S	28	.720	72.8	51.3	21.5	48.6	61.0	0.4	NW.	0	5.5	0.003	0.135	57.5
S	29	.753	75.1	49.1	26.0	46.0	63.0	0.2	NW.	4	4.5		0.144	58.5
M	30	.727	77.0	53.0	24.0	48.6	63.7	0.2	W. & S.	2.5	5		0.195	59.4
T	31	.592	70.2	55.2	15.0	58.0	60.3	0.3	SW. & W.	6.5	6	0.335	0.145	58.8

AUGUST, 1855.


2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
A TEMPERATURE.
90· 88 86 84 82 80 78 76 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12
N
O
P
B PRESSURE.
30·70 ·60 ·50 ·40 ·30 ·20 ·10 30·00 29·90 ·80 ·70 ·60 ·50 ·40 ·30 ·20 ·10 29·00 28·90 ·80 ·70 ·60 ·50 ·40
C CLOUD.
·10 ·8 ·6 ·4 ·2 ·0
D RAIN.
1·3 1·1 0·9 0·7 0·5 0·3 0·1
E OZONE.
10 9 8 7 6 5 4 3 2 1 0
F WIND.
N. NE. E. SE. S. SW. W. NW.
G TOTAL CASES OF DISEASE.
65 60 55 50 45 40 35 30 25 20 15 10 5 0
H TOTAL DEATHS.
15 10 5 0
I DISEASES OF RESPIRATORY ORGANS.
30 25 20 15 10 5 0
J DISEASES OF DIGESTIVE ORGANS.
30 25 20 15 10 5 0
K INTEGUMENTARY DISEASES.
30 25 20 15 10 5 0
L DIARRHŒA.
30 25 20 15 10 5 0
M FEVER.
30 25 20 15 10 5 0

ON THE HURRICANES OF THE SOUTH PACIFIC OCEAN.

BY THOMAS DOBSON, ESQ., B.A.

THE South Pacific Ocean and the adjacent portion of the Antarctic Ocean cover together more than one-eighth of the surface of the globe. Until very recently, this immense expanse of waters was comparatively little frequented by ships; and consequently, nothing is yet known of the nature of the hurricanes which sweep over its vast surface. In every other maritime region, the results of the infant science of Cyclonology are already of considerable extent and importance. In all seas but these, more or less is known of the nature of the great paroxysmal phenomena of the atmosphere; their seasons have been observed, their rotatory character established, and their progressive motion determined, with an accuracy little short of geometrical.

During a residence of several years in some of the principal seaports of Australia, Van Diemen's Land, and New Zealand, I have collected much information on this subject from ships' logs, local newspapers, etc., which, when compared and combined with the isolated notices of storms that have appeared from time to time in the "Nautical Magazine," in the periodicals of the various Missionary Societies, etc., will be found to throw considerable light on the nature of the Hurricanes of the South Pacific Ocean.

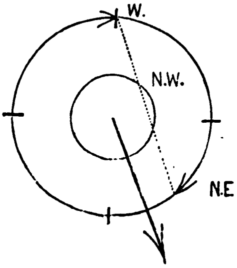
I shall first consider a class of hurricanes which derive a peculiar importance from the circumstance of their track lying in the neighbourhood of the British colonies along the east coast of Australia, and passing over the French settlement in New Caledonia, and the several British settlements in New Zealand. These hurricanes are generally first heard of at the New Hebrides and the Feejee group.

The general facts respecting the hurricanes of the Feejee Islands, were first published by Captain Wilkes, in his narrative of the American Exploring Expedition. Captain Erskine, in his "Journal of a Cruise among the Islands of the Western Pacific," repeats the information given by Wilkes, and attempts to determine the direction of progressive motion of the hurricanes. He states that—

> "The hurricanes of the Feejee group are reported to commence at NE., veer to NW., and moderate at W.; which shews a *north-easterly* progressive direction. If this be the case, the area of these storms would not include the Tongan Islands, although they would probably be the same as those which pass over the Samoan group. Simultaneous observations at all these places can alone determine questions of this nature."

Now, a little consideration will shew that the direction of progression assigned in this extract is incorrect; for, the motion indicated by the changes from NE to NW and W, in the southern hemisphere, is obviously towards the SSE.

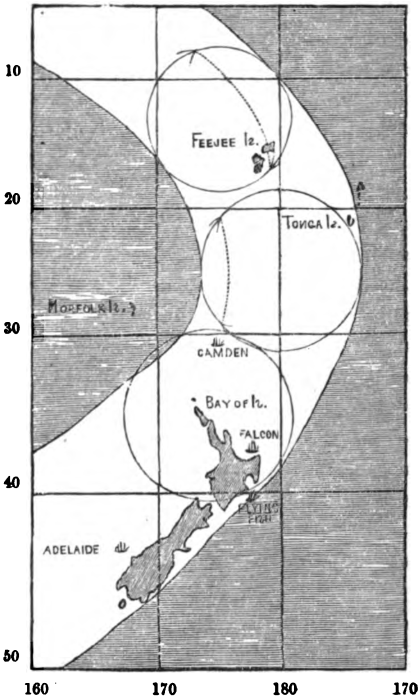
Captain Wilkes has given an account of a storm at the Feejee Islands, in the end of February, 1840; and of another at New Zealand in the beginning of the following March; and has suggested that these



storms were probably identical. Having learnt that the Missionary ship, Camden, had passed between these places about that time, I inspected her log-book at Hobart Town, and was thereby enabled to *prove* the identity surmised, and to determine the first storm-track in the South Pacific Ocean. The storm at the Feejees is thus described by Captain Wilkes:—

"At the Feejee group, from November to April, the winds prevail from the ENE to the SE quarter, at times blowing a fresh trade-wind. From November to April northerly winds are often experienced, and in February and March heavy gales are frequent. They usually begin at the NE, pass round to the N and NW, from which quarters they blow with most violence; then, hauling to the westward, they moderate.

A very heavy gale was experienced from the 22nd. to the 25th. of February, 1840. The only data I could get to be at all depended upon, were from Captain Engleston, whose ship was lying under Toba Peak, on the north shore of Vitileva. The gale began from the NE with heavy rain on the morning of the 22nd. During the night and the morning of the 23rd., it was more to the N, increasing with heavy gusts. They let go a third anchor, and sent down the topmasts and lower yards. On the 24th., the gale was the same with much rain; the wind hauling to the westward at midnight of the 25th. It became NW in the morning, and began to moderate; the wind hauling gradually to the southward, when it cleared off. This gale was not felt at Tonga, although they had strong winds there at the time."



Here the wind *veers continuously* through half the points of the compass. *This storm was therefore a Cyclone.* If the wind was *turning* in a direction contrary to the motion of the hands of a watch, that is, from N to W, S, and E, as it turns in the Cyclones of the northern hemisphere, the storm was moving towards the NW. But if the wind was turning in the same direction as the hands of a watch, that is, from N to E, S, and W, (as analogy would lead us to expect in the southern hemisphere,) then the storm was moving *towards the SE.* Here, then, is a test, both of the cyclonic nature of the storm, and of the direction in which the wind was *turning;* for, if it appears that the storm moved to the southward, then the shifts of wind from NE to N and NW prove that the wind was *turning* in the same direction as the motion of the hands of a watch; and prove, at the same time, that it was a Cyclone. The appearance of this storm a few days afterwards, several degrees to the southward of the Feejee Islands, is shewn in the following extracts, which I have made from the Journal of Captain Morgan, now of the Missionary brig, John Williams, who commanded the Missionary ship, Camden, in 1840, and encountered the storm on the passage from Sydney to Tutuila.

"*1840.* Feb. 27th.—Lat. 31° 45′ S, Long. 171° 52′ E, wind shifted suddenly from N to SW, and then to SE.

28th., Friday.—Increasing breeze from eastward; barometer falling gradually. Midnight, under double-reefed topsail and foresail. Lat. 31° S, Long. 174° 7′ E.

29th., Saturday.—Wind increased from SE till 10 a.m., when it blew a perfect gale—yea, a hurricane. Barometer 28.40. Took in all sail and lay on our side; kept the pumps sucking; the water came up the skin into the cabins between decks. The sea stoved the whale boat, triced up in the rigging, and we were forced to cut her away. At noon it began to abate a little, and at 2 p.m. the gale had subsided. Sent down top gallant yards, with fore top gallant mast. At 7 p.m. wore round, the wind at SW, set main topsail and foresail, steering NE.

March 1st.—A light SE wind. I have known it to blow as hard, but never harder; we could not look to windward for a second at a time."

Mr. G. A. Lundie, a passenger by the Camden, in a work entitled "Missionary Life in Samoa," published in 1849, says—

"A few days since, we met a fearful and long-continued hurricane. Friday (28th.,) was a day of rough and restless calm; the barometer fell gradually. In the evening a fresh breeze set in, increasing gradually till 4 a.m., (29th.) Lay to under a small sail, to keep the vessel from rolling. 8 a.m., without a stitch of canvass, at the mercy of the fierce wind and infuriated waves. The lee bulwarks and nearly half the deck under the boiling waters; the day-time darkness rendered more dismal by the burning of a solitary lamp. Boat, bulwarks, etc., carried away. At 11h. 45m. a.m., the mercury began to rise; at 1 p.m. the rain had ceased, but the wind had not perceptibly abated. The sun shone out at 4 p.m., the wind subsided, and continued to abate till Sunday morning."

The *shift* of wind is here from SE to SW; the Cyclone was therefore moving *towards the south.* This inference is confirmed by the appearance of the storm at New Zealand, on the 1st. of March, as we learn from Wilkes' Narrative, page 381, vol. ii.

"On the 29th. of February, 1840, there was a violent gale at the Bay of Islands, New Zealand, said by the missionaries to have been the severest they had experienced, with, perhaps the exception of one, which took place shortly after their arrival. Many vessels suffered great damage. The Thom, of Sag Harbour, which sailed a few days before, bound home, was obliged to put back in consequence of the damage received, and was condemned as unseaworthy; as was also the Tuscan, an English Whaler. The barque Nimrod arrived, having lost her topmast; several coasters were missing, and supposed to have been lost. Most of the vessels lying off Kororarika dragged their anchors. The Harriet was driven ashore at Tipoona; she parted her cables during the night, and next morning was found a complete wreck; the crew barely escaped with their lives. On land, fences were carried away, houses and grounds deluged, and the extensive embankment of the missionary establishment at Pahia nearly demolished. The tide rose six feet beyond its usual mark, during the night of Saturday. This gale was experienced at the Thames, on board H.M.S. Herald, one hundred and forty miles to the south; also by the Flying Fish, off Cook's Straits, on the east; and by the barque Achilles to the north. Mr. Hale was a passenger in the Achilles, and took barometrical observations and notes, from which it appears that the change took place, at the two northern and two southern positions, in opposite directions, proving that the gale was a rotatory one; and that its centre must have passed between the Bay of Islands and the River Thames. The greatest force of the gale was between 1 a.m. and 3 a.m. of the 1st. of March. At the Bay of Islands a *calm* was observed by Mr. Dana and others, which lasted fifteen minutes, after which the wind rapidly hauled round to the westward, and blew with increased violence. On board the Herald the barometer fell to 28.75; and as the gale was experienced first to the northward and eastward, it is certain that it came from that quarter, and passed over New Zealand in a SW direction. The width of its track was about five hundred miles."

On the 29th. of February the Flying Fish was in 40° S, and 175° 30′ E. At noon the wind hauled to SE, and by midnight blew a most violent gale, hauling to the eastward till about 8 p.m., (March 1st.,) when its violence moderated.

In a note to page 61 of the "Sailor's Horn Book of Storms," Mr. Piddington, speaking of this storm, says—

"Its track to the south-westward, or perhaps SSW, after crossing the island, I am enabled perhaps to corroborate from a log in my possession, of the Adelaide, which vessel, between the 1st. and 2nd. of March, about 3° 30′ due west of Cape Egmont, experienced a smart gale, commencing at about E by S, or ESE, and veering to S by E, reducing her to close reefs with a heavy cross sea. This, roughly calculated, gives three hundred and forty miles for thirty-six hours, or about ten miles per hour."

The author of "Rovings in the Pacific," page 64, met with a most violent gale from the northward, on the 29th. of February, 1840, when off the Three Kings, at the northern extremity of New Zealand. The vessel was thrown on her beam ends. Next day the wind moderated and gradually veered round to the SE. The vessel had drifted to the southward of the Bay of Islands. Hundreds of red bream were floating about, killed by the gale.

From letters to the editor of the "Sydney Morning Herald," and various paragraphs, we are enabled to judge of the effects of the storm on the coasts of New Zealand.

A letter dated "Kororarika, Bay of Islands, March 11th., 1840," states—

"We suffered dreadfully here from a hurricane on the night of the 29th. of February; all our boats were knocked to pieces, palings blown away, and we expected every moment that our houses would have taken flight. Never was such a night. The natives were up the entire night saving their canoes. Several persons were obliged to open their doors to let the sea rush through. It was a terrible night. Had it lasted two hours more, it would have swept everything before it. Every ship drove. The Herald lay snug, but had two of her boats swamped, and lost all their gear. The Tuscan and Tobacco Plant, American Whalers, have come in in such a leaky state, that they will have to be condemned; the

Harriet, of Sydney, was totally wrecked in the gale; she drove on the rocks off the mouth of the Kiri-kiri, with both anchors down a-head."

The inhabitants of the New Colony, (Wellington,) at Port Nicholson, appear to have felt the effects very severely. The whole of their temporary huts were blown down, and great distress ensued in consequence. Vessels lying at the Bay of Plenty all experienced damage, more or lsss. The schooner Felix, which was wrecked, is a little vessel of twenty-five tons, which was driven into Newcastle, N. S. W., some months back, the crew (Maoris,) not knowing where they were; after which she proceeded to Tahiti from Sydney, and traded about the islands of New Zealand. The whole crew was lost on their passage from Coromandel Harbour to the Bay of Islands. Lost in the Bay of Plenty:—The schooner Falcon, crew saved; the Felix, crew lost; the Ulietea, crew saved; the Industry, crew saved; and the schooner Trent, by stranding in the River Thames. Thirty-eight boats were lost in the Bay of Islands; The Navarino, from Kaipara, is a total wreck. During the hurricane a heavy flood inundated the site of the proposed capital of the New Zealand Colonization Company.

From "Wakefield's Adventures in New Zealand," we learn that the wind was N with rain, at Wellington, from the 23rd. to the 27th. of February, 1840, followed by a heavy SE gale from the 1st. of March to noon of the 4th., and great floods at the Hutt.

At Whakatane, in the Bay of Plenty, in 1854, I met with Mr. P. Tapsell, who commanded the Falcon, schooner of one hundred and ninety tons, when she was lost. He was proceeding at the time to Maketu, to take in a cargo of flax. On the 29th. of February, the wind was from the E, with a very heavy swell from N. Midnight; wind shifted round to the N, with a very heavy sea, which broke clean over the fore-yard and filled the hold. Let go the second anchor; the chain parted, and the vessel struck on the beach at Tumoo. The natives from the Pa immediately plundered and stripped her. At Whakatane, I was told that the sea dashed over the great sandbank that skirts the beach, even up to the Pa; and that several of the large isolated rocks off the coast were thrown down.

This Cyclone passed to the Southward of Van Diemen's Land; for it is remarked in the "Colonial Times," a Hobart Town newspaper of March 3rd., 1840, that—

> "Nothing could have been finer than the weather during the past week. The temperature moderate and steady; neither hot winds during the day, nor chilling dews in the night. It is most improbable, then, that atmospherical causes can at all contribute to the existing fatal malignant fever. Barometer at twelve to-day, 30.01. Thermometer in shade 64°."

The Vincennes was in 50° S, and 135° E, and had no storm.

The track of the Cyclone here was as nearly as possible parallel to the west coast of the middle island of New Zealand.

(To be continued.)

THE WONDERS OF THE ATMOSPHERE: A POPULAR TREATISE ON METEOROLOGY.

BY EDWARD JOSEPH LOWE, ESQ., F.R.A.S., ETC.

(Continued from page 33.)

CHAPTER I.

Our earth, with other planetary bodies revolving around the sun, is surrounded by an envelope, which we have called an atmosphere. This envelope is densest at the earth's surface, rapidly becoming thinner and thinner as we rise into the air. And why is the atmosphere heavier near the surface of the earth? Because it has to support the weight of the whole column of air above it, which, owing to its being very compressible, compels it to occupy less space; consequently there is a greater amount of air in a given surface. This law of decrease in pressure being known, its application is made use of in the measurement of mountains, for the barometer will indicate a less pressure on the summit than at the base, in proportion as it is high. As an instance, let us take the measurement of a mountain:—

Barometer at the base 30.00 inches. Temperature 60°
" " summit 25.70 inches. " 44°

The mean of these two observations of the barometer is 27.85 inches, their difference 4.30 inches. The mean of the two observations of the thermometer is 52°

In a table of factors constructed by Sir George Shuckburgh, the factor of 52° is 910.8 feet,

$$\therefore \frac{30 \times 4.30 \times 910.8}{27.85} = 4218.9 \text{ feet.}$$

Therefore 4218.9 feet is the height of the mountain.

Thus the following rule will enable any one to measure a hill with a barometer:—

Let x = height of the hill required.
A = mean height of the two barometer observations, (that is at the base, and at the summit.)
a = the difference of the two barometer observations.
b = the factor in the Table corresponding to the mean of the two thermometer observations.

(Barometer at 30 inches.) Then $x = \frac{30ab}{A}$

The atmosphere is a subtle invisible fluid, surrounding us on all sides. Without it neither animals nor vegetables could have any existence; indeed, without an atmosphere, much of the light we now enjoy would vanish, for we should only be enabled to observe objects when we faced the sun; on turning our backs to that luminary, all would be darkness, except the feeble light of the stars, which would shine even at noonday; and those sheltered valleys, in which such numerous tribes of animals and plants delight, would be shrouded in a midnight darkness. Without an atmosphere we should have no twilight; and the instant the sun sunk below the horizon, day would give place to night. Were we deprived of the air, all nature would be silent as the grave; the charming harmony of the birds, the hum of the insects, the booming of cannon, the growling of the thunder, the rippling of the waters, and the whistling of the wind, would never more be heard; and the voice of man, even if he might live under these circumstances, would be dumb.

Not only should we lose light by having no atmosphere, but also by having one of too great thickness. M. Bouguer tells us that if the earth's atmosphere was seven hundred miles in extent, the sun's rays would not penetrate it, and the earth would be dark. He further tells us that the sea-water loses all transparency at the depth of seven hundred and thirty fathoms; although a dim twilight extends for some distance deeper. The late Professor E. Forbes, also remarked that at the depth of two hundred and thirty fathoms the mollusca which there exist are without colour, as proved from extensive dredging in the Ægean Sea, and he considered that not only shell-fish, but that all animal life ceases below the depth of three hundred fathoms.

Until the year 1774, the air was supposed to be a simple element, all things being then considered as composed of four elements—earth, air, fire, and water; but in August of that year Dr. Priestly obtained from the atmosphere oxygen gas; and in 1775, a Swede, M. Scheele, without being aware of Priestly's labours and success, discovered oxygen in the air; from which researches it became known that our atmosphere was not a simple but a compound fluid.

Atmospheric air is a mixture of oxygen and azotic gas, in the proportion of 76.9 grains of azote, or nitrogen, to 23.1 grains of oxygen; or, by measure, 7919 parts of nitrogen, to 2081 parts of oxygen; besides which the air contains a very small quantity of ammonia, (water in an invisible state being variable, and depending much on the temperature,) and one part in two thousand of carbonic acid gas, together with several local compounds. Philosophers have brought air from the summits of Mont Blanc and Chimborazo, from the plains of Egypt, from an elevation of 21.000 feet by the aid of a baloon, from the cities of London and Paris, and elsewhere; but after analyzation the proportion of oxygen and azote have not been found to vary—they are shown to be the same all over the earth, and also at all heights above the earth. It is the stability of these gases that enables both the animal and vegetable kingdoms to flourish; for an alteration in their proportions would cause universal destruction. The diffusive energy of the air is sufficient to spread it equally all over the world. Carbonic acid gas, on the contrary, varies much from local causes.

It will be, perhaps, sufficiently interesting to devote a few words to the two gases which sustain us. Oxygen is colourless, tasteless, and inodorous; it is the principle by which animal life is sustained, and by which combustion is brought about: it is a little heavier than atmospheric air. Nitrogen has neither taste, colour, nor smell, and is incapable of supporting either combustion or animal existence, and is rather lighter than atmospheric air.

In speaking of the mixture of oxygen and azote in the atmosphere, it is not meant to imply that they are chemically united, like a lump of sugar dropped into a glass of water, which, when melted, sweetens the whole; or as copper and zinc, which are chemically united to form brass: the gases are mechanically mixed, as the pouring sand out of two vessels into one. To clearly understand the difference between the two terms chemically united and mechanically mixed, suppose we pour 250 grains of sand out of each of two vessels into a third, we have then mixed 500 grains mechanically; or, as with the atmosphere, if we pour into a flask 400 atoms of azote and 100 of oxygen, we have 500 atoms, which is nearly the proportion in which they are mixed in the air. On the other hand, if we melt 100 parts of copper with 100 parts of zinc, when melted there will yet be only 100 parts, as each part of zinc has become chemically united with each part of copper. Were the air chemically united instead of mechanically mixed, we should all be destroyed, for it would produce the terrible fluid nitric-acid, commonly known as aqua-fortis.

The height of our atmosphere is a question much disputed. M. Biot conceives it to be 18 miles, Sir John Lubbock scarcely 22½ miles; some extend it to 50, others to 80, and Dr. Dick to 200 miles. The great meteor of February 11th., 1850, whose path was so admirably traced by James Glaisher, Esq., of the Royal Observatory, when first seen in the north of England, was at a height of 90 miles above the earth's surface, finally bursting in Bedfordshire, at an elevation of 23¼ miles; yet the noise resulting from the explosion was so loud as to be heard at the distance of more than 100 miles; not only proving that the body was of great size, (Mr. Glaisher calculates it to be three-quarters of a mile in circumference,) but that the atmosphere must have extended beyond this elevation. Most likely the atmosphere extends to the height of about 50 miles; at 37 miles, according to Mrs. Somerville, it is sufficiently dense to reflect the solar rays when 18° below the horizon. The bursting of a meteor, whose diameter was half-a-mile, which occurred in the year 1783, at a height above the earth's surface of 50 miles, was heard like a cannon, although the air at that elevation is three thousand times lighter than that at the level of the sea.

The moisture in the air is due to our great oceans. The heat of the sun causes rapid evaporation, the aqueous particles are thus carried into the atmosphere in an invisible condition, until they meet with a cold current, when they become visible in the form of clouds, which float along for a time, and are then again deposited in the condition of rain, snow, or hail, as the case may be; these, when they fall on islands or continents, hasten along, accumulating as they progress, until the drop of rain forms a stream, streamlets accumulate into rivers, and at length the drop is conveyed back to its parent the ocean, to be again evaporated and carried into the air. Rivers all flow into the seas, yet these oceans are never too full, because they give back an equivalent; for evaporation is *the cause*—the *making of rivers,* and is incessantly going on to keep them flowing.

(To be continued.)

CALENDAR OF NATURE FOR AUGUST, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

BY THE EDITOR.

August 1st.—Very few slugs of the following species have been noticed this summer:—Limax arborum, Limax cinereum, and Arion empiricorum: last winter seems to have destroyed most of them.

13th.—Barley and oats cut. In 1848, corn was cut on the 1st.; 1850 also on the 1st.; 1851, on the 5th.; 1852, on the 3rd.; 1853, on the 8th.

15th.—Wasps, (*Vespa vulgaris,*) appeared: they have been very scarce.

16th.—Many fields of barley and oats cut.

19th.—Apricots ripe. In 1843, became ripe on the 16th.; in 1846, on July 16th.; in 1847, on August 18th.; in 1848, August 1st.; in 1850, August 11th.; in 1851, July 28th.; in 1853, August 20th. The mean time being August 7th., and the range in days thirty-five. This year the period was twelve days later than usual.

20th.—Wheat cut.

22nd.—Wheat shearing general. Many apples blown off by the gale yesterday.

26th.—Barley stacked.

27th.—Wheat stacked. Apricots generally ripe.

SNOW CRYSTALS.

BY THE EDITOR.

(Continued from page 33.)

Figures 25 to 29 fell between 9 and 10 a.m., on the 12th. of February; during this shower No. 28 was common. This Crystal was solid, with six holes of the form of a crescent-moon.

Figures 30 to 44 occurred on the 11th. of March, between 3 and 5 p.m. The diversity of form on the afternoon of the 11th. was very great, many more Crystals having been observed than it was possible to sketch.

Figures 45, 46, and 47, were noticed on the 22nd. of March, at 12h. 30m. p.m. Most of the Crystals resembled No. 46.

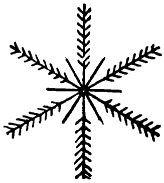
Figure 48 represents a double Crystal: it is not uncommon to notice two or more Crystals frozen together.

(To be continued.)

SNOW CRYSTALS.—Sketched at the Beeston Observatory, in 1855.

(MAGNIFIED.)

25



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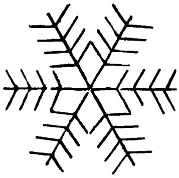

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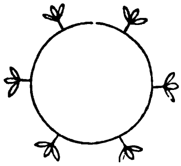

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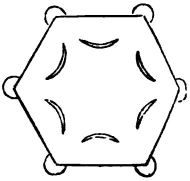

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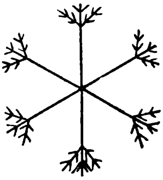

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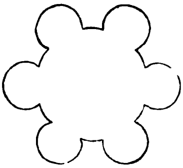

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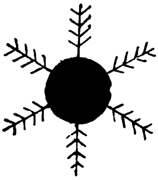

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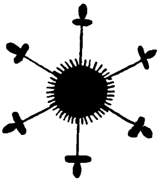

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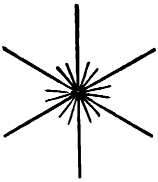

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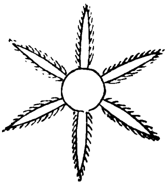

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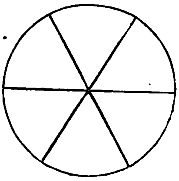

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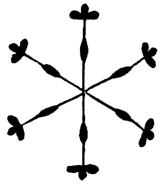

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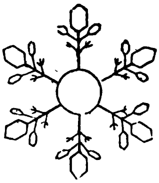

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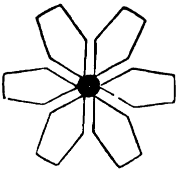

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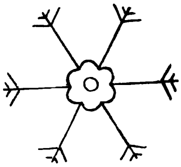

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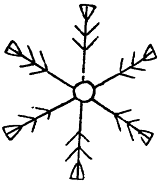

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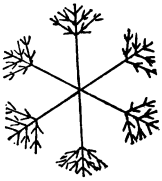

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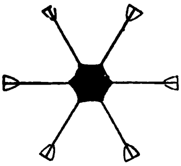

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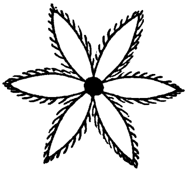

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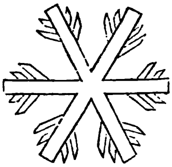

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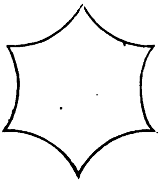

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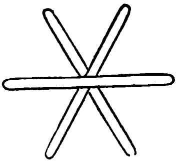

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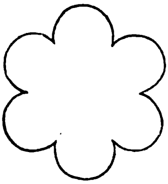

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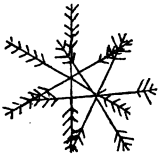
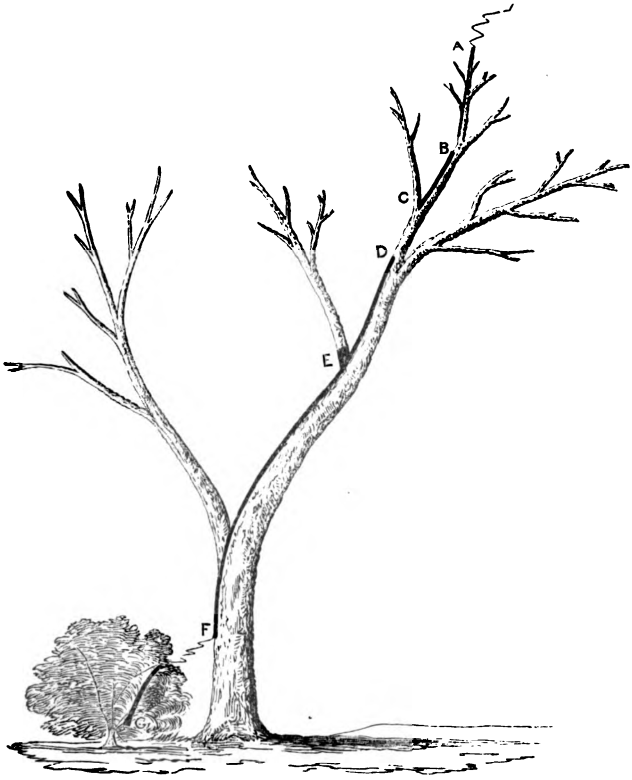


TREE AT LENTON,
STRUCK BY LIGHTNING ON THE 28th. OF MAY, 1854.



The lightning struck the topmost twig, A, of an Apple Tree, but for the first three feet the only injury occasioned was the scorching of the expanded leaves. At B the lightning began to plough a path down the tree, of about half an inch wide, the fragments forced out being in long strips of from two to ten inches, and very jagged and splintery along the edges. Two feet lower, C, the fluid encountered an upright bough; here it struck deeper into the tree, and ceased cutting the wood. Two feet lower, D, the lightning again ploughed a path, the furrow gradually becoming wider and deeper as it progressed. At E it passed a small branch, which, near the bole, was entirely peeled. At F, four feet from the ground, the marks of the lightning ceased, and the only trace below this was in a shrub, *(Ribes sanguineum,)* G, which had a bough reaching within a foot of the tree. Singular enough the bough had all its leaves scorched and burnt at two feet distance from the tree struck, whilst that portion *nearer* remained uninjured. From an examination it appeared evident that the flash was a *down stroke,* which was met at four feet from the ground by an *up stroke,* for all the pieces of wood were splintered *downwards,* except at four feet from the ground, where several were splintered *upwards.* The damage done was greatest at four feet from the ground. The flash was confined within very narrow limits; in some places leaves were uninjured only two inches distant from the lightning furrow, yet in several places they were scorched three feet off. Many examples of the American Blight, *(Aphis lanigera,)* were found uninjured within half an inch of the lightning stroke. Within a dozen yards of the tree struck, was another much taller, which escaped injury. The tree does not appear to have suffered in the slightest degree from the lightning stroke, as it has grown vigorously, and ripened fruit.

METEORS, OR FALLING STARS.

BY THE EDITOR.

Considerable obscurity hangs over those curious bodies which are occasionally seen to shoot along the sky, and which at times have been so numerous as to have resembled fireworks, on a grand scale. In the present paper it is proposed to describe all the peculiarities that have been noticed by trustworthy observers, and to place such materials before the reader as shall enable him to form some conclusions as to this remarkable as well as interesting phenomenon.

For some time M. Quetelet made a very complete catalogue of the meteors which were observed in various parts of the world, (see vol. ix. "Nouv. Mem. Acad. Bruxelles.") After M. Quetelet's labours ceased, the Reverend Professor Baden Powel commenced a similar work, the first part of which was published in the Report of the British Association, for 1847, and has been continued every year from that time; indeed this catalogue has now become exceedingly valuable. This paper will chiefly be limited to Professor Powel's reports; yet before referring to those reports, it seems necessary to give a brief account of some extraordinary phenomena, which have been observed prior to 1847. Perhaps the most striking form in which shooting stars have appeared, is that of meteoric showers, which for several successive hours have lit up the whole sky with a blaze of light. Such a display occurred in the United States, on the evening of the 12th., and morning of the 13th. of November, 1833. Between four and six o'clock in the morning, it was estimated that more than a thousand occurred every minute. This appearance was traced from the longitude of 61° in the Atlantic ocean, to 100° degrees in Central Mexico, and from the North American Lakes to the West Indies. Another similar appearance had been noticed on the night of November 12th., 1779; and the inhabitants of Cumana assert that a similar display occurred in 1766. In 1832, on November 13th., Captain Hammond witnessed thousands of meteors.

At Mocha, on the Red Sea, in 1799, on November 12th., Mr. Ellicot, near Cape Florida, observed the heavens so full of shooting stars as to give the appearance of being filled with sky-rockets. On this night the display was seen at Santa Fe, Qumana, Quito, Peru, as far north as Labrador and Greenland, and as far east as Weimar, in Germany. On the 13th. of November, 1831, Meteoric showers were seen in Spain and Ohio. Similar displays were seen on the 13th. of November, in the years 1834, 1835, 1836, and 1837. It will be seen that all these *showers* occurred on the 12th. and 13th. of November, and consequently must be periodic; the singularity of the phenomenon is, why we do not witness the display every year.

The principal features of these shooting stars render it necessary to place these bodies in several classes.

1st.—Showers of meteors which have been known to occur at certain epochs, and which are, even at the present time, sufficiently numerous to mark those epochs.

2nd.—Meteors remarkable for their large size and great brilliancy.

3rd.—Those bodies that are rendered curious by peculiarities not usually noticed.

Under the first class it is requisite to trace *when* those epochs take place, from what portion of the heavens the meteors diverge, and to examine all the phenomenon accompanying these displays. Under the second class, the appearances are very different in different meteors; some explode with a loud noise resembling thunder, many move very slowly, the form of them various, the colours different, and the appendages, in the shape of streams of light, separate balls, etc., are features requisite to be examined.

Under the third class, the peculiarities are more marked than in either the first or second class.

(To be continued.)

THE EARTHQUAKES BETWEEN 1852 AND 1855.

It will perhaps interest many readers, recording, in as brief a manner as possible, an account of the different Earthquakes that have occurred during the past four years:—

1852. February 16th., a shock at Palermo.

,, End of February, slight shocks in N. of Spain. The cold intense, and the mountains in Andalusia covered with snow.

,, February 22nd., at 5h. 30m. a.m., shock at Pau, accompanied by a noise resembling distant thunder.

,, March 31st., a very severe shock at Lucknow.

,, April 3rd., at 3 a.m. slight; and at 6 a.m. smart shock; at Wells Cheddar, Axbridge, Mendip-hills, Clifton, Pensford, etc., accompanied by a loud rumbling noise.

,, April 1st., smart shock at 5h. 30m. a.m. along the S. end of Mendip, Cheddar, Winscombe, etc. Bells rang and clocks struck, etc.

,, April 1st., on the Zobten, one of the spurs of the Riesenberg chain of hills—Breslau. A violent commotion, with an eruption of clouds of dust. An immense chasm, into which the hill-peak had sunk, was formed.

,, May 26th., and for fifteen days, very violent shocks in China, in the province of Kau-suh, commencing near Chung-wei. The devastation and loss of life was frightful. Three hundred persons were killed, and twenty thousand houses destroyed.

,, June 1st., at 7h. 30m. a.m., in South Wales. Bells rang and windows shook violently at Sketty, the Mumbles, Neath, Aberavon, and Bridgend.

,, June 6th., a subsultory shock in the island of Ischia.

,, June 7th. and 8th., severe undulatory shocks in Italy, at Melfi, Rapolla, and Barili, in the kingdom of Naples.

,, July 7th., at 7h. 30m. a.m., three very violent shocks at Kingston, Jamaica.

,, July 17th., 7h. 20m. a.m., at sea, 70′ W. from Jamaica: a severe shock.

,, July 26th., at 10 p.m., a severe shock at Kilmarnock, Scotland.

,, August 12th., in Cornwall and Devonshire, at 7h. 30m. a.m., at Callington, Coad's Green, Liskeard, Walkhampton, Stoke-by-Devonport. A severe shock—the bells rang.

,, August 17th. and 18th., heavy shocks at Port-au-Prince.

,, August 20th. to 30th., violent eruptions of Mount Etna.

,, September 16th., at Manilla, very violent. Volcano at Taal, which had been closed for a hundred years, was active after the earthquake.

,, September 17th., at 8 p.m., a shock at Manilla.

,, September 18th., at 8 a.m., a shock at Manilla.

,, September 19th., at noon, a shock at Manilla.

,, September 20th., at 10h. 15m. a.m., a shock at Manilla.

,, September 22nd., at 10h. 15m. a.m., a shock at Manilla.

,, September 22nd., severe at Spanish Town, Jamaica.

,, September and October, violent at Manilla. Also at Volparaiso.

,, October 5th., as 5h. 15m. a.m., a shock at Crieff.

,, October 10th., at 6h. 30m. a.m. and 3h. 30m. p.m., shocks at Manilla.

,, October 12th., at 8 a.m., a shock at Manilla.

,, October 13th., twelve miles from the equator, long. 19° W. for fifteen minutes a rumbling noise, which became deafening, and the sea rose in mountainous waves.

,, October 26th. to November 1st., eruptions of Etna violent.

,, October 30th., 1h. 30m. a.m., violent shock at Malaga.

,, Early in November, a shock in Virginia, U. S.

,, November 9th., at 3 a.m., a shock at Llandrinio.

,, November 9th., at 4h. 30m. a.m., shocks at Liverpool, Booth, Birkenhead, Woolton, Childwall, Aigburth, Oxton, Claughton, in Cheshire; Bangor, Holyhead, Manchester, Congleton, Shrewsbury, Ellesmere, Carnarvon, Chuk, North Wales; Dublin, Kingstown, Bray, Kilruddery, Dalkey, Glengary, Howth, Clontarf, Glasnevin, Birmingham, Wolverhampton, Worcester, and Malvern.

,, November 26th. to December 22nd., tremendous in Indian Archipelago.

,, November 26th., a shock at Jamaica.

,, December 4th., destruction of Acapulco, Mexico.

,, December 9th., a shock at Kingston.

,, December 13th., a slight shock at Wirtemberg.

1853. January 12th., shocks at Arden and Underswick, Sweden.

(To be continued.)

STATE OF THE WEATHER IN AUGUST, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY.

1st., fair, with rain from noon till 1 p.m. 2nd., fine, with showers at 5h. 40m. p.m. 3rd., fine, windy. 4th., showery. 5th., fine. 6th., rain. 7th., fine; thunder-storm from 4h. 30m. p.m. to 11 p.m. 8th., fine; 11 a.m. thunder. 9th., fine. 10th., fine. 11th., fine; 9h. 50m. p.m., rain. 12th., fine. 13th., fine. 14th., fine. 15th., fine. 16th., fine. 17th., fine. 18th., fine. 19th., fair, windy; rain after 8 p.m. 20th., fine, rain after 10 p.m. 21st., fine. 22nd., fine. 23rd., rain; 9 p.m. lightning. 24th., fine. 25th., fair; from 5 p.m. showers. 26th., fine. 27th., rain from 8h. 30m., a.m., till 10h. 15m. a.m., then fair. 28th., fine. 29th., fine. 30th., fine. 31st., fine.

Result of observations made at Highfield House, in August, 1855:—

Mean height of barometer, corrected and reduced to 32° F., (altitude of cistern above the sea level being 181 feet,) 29.809 inches.

Mean pressure of dry air, or that of the gases, 29.361 inches.

Elastic force of vapour, or mean pressure of the water contained in the air 0.448 of an inch.

Excess or defect of the barometer in August, 1855, from the mean of the last eight years + 002 of an inch.

Mean pressure of August from 1847 to 1854, 29.807 inches.

Greatest height of the barometer, (reduced,) 30.181 inches, (on the 16th.)

Least height of the barometer, (reduced,) 29.406 inches, (on the 4th.)

Range of the barometer, 0.775 inch.

Mean temperature of the dry-bulb thermometer, corrected for diurnal range, 61.7°.

Mean temperature of the greatest heat and greatest cold of each day, corrected for diurnal range, 59.7°

Adopted mean temperature, 60.7°.

Mean temperature of August from 1809 to 1852, 58.9°.

Mean temperature of August from 1847 to 1854, 59.1°.

Mean temperature of August from 1810 to 1820, 60.0°.

Mean temperature of August from 1820 to 1830, 61.0°.

Mean temperature of August from 1830 to 1840, 59.8°.

Mean temperature of August from 1840 to 1850, 59.8°.

Excess or defect of August, 1855, from the mean temperature of the last eight years + 1.6°.

Excess or defect of August, 1855, from the mean temperature of the last forty-years + 1.8°.

Greatest cold of the night 40.7°, (on the 10th.)

Greatest heat of the day, 81.2°, (on the 17th.)

Diurnal range of temperature, 40.5°.

Minimum temperature on grass, 36.8°, (on the 10th. and 30th.)

Maximum temperature in sunshine, 112.6°, (on the 10th.)

Range of temperature between the greatest cold on the grass and the greatest heat in the sunshine, 75.8°.

Greatest amount of solar radiation, 41°, which occurred on the 10th.

Greatest amount of terrestrial radiation, 5.8°, which occurred on the 2nd.

Mean temperature of the wet-bulb thermometer, corrected for diurnal range, 58.3°.

Mean temperature of evaporation, 57.9°.

Mean temperature of the dew point, 55.4°.

Mean temperature of the dew point between 1847 and 1854, for August, 53.6°.

Excess or defect of the mean dew point, + 1.8°.

Mean amount of ozone, 3.7.

Mean amount of ozone in the night, 3.5.

Mean amount of ozone in the day, 3.9.

Number of nights without ozone, 4.

Number of days without ozone, 4.

Mean amount of ozone with a west wind, 2.8.

Mean amount of ozone with a north-west wind, 3.6.

Mean amount of ozone with an east wind, 6.3.

Mean amount of ozone with a south-east wind, 4.0.

Mean amount of ozone with a south wind, 3.8.

Mean amount of ozone with a south-west wind, 3.7.

Amount of rain fallen twenty-five feet from the ground, 1.098 inches.

Amount of rain fallen two feet from the ground, 1.147 inches.

Average amount of rain in August, for the past eleven years, 2.8 inches.

Excess or defect in August, 1855, of the average fall of rain, — 1.7 inches.

Number of days on which rain fell, 14.

Amount of evaporation, 5.015 inches.

Average amount of evaporation in August, between 1848 and 1854, 4.9 inches.

Excess or defect in the amount of evaporation from the mean in 1855, — 0.1 of an inch.

Mean daily amount of evaporation 0.162 of an inch.

Greatest amount of evaporation in twenty-four hours, 0.272 of an inch.

Least amount of evaporation in twenty-four hours, 0.037 of an inch.

Mean amount of cloud at 9 a.m., 6.5.

Mean amount of cloud at 10 p.m., 4.2.

Mean daily amount of cloud, 6.0.

Number of days overcast at 9 a.m., 6.

Number of days overcast at 10 p.m., 6.

Number of days cloudless at 9 a.m., 1.

Number of days cloudless at 10 p m., 9.

Mean weight of vapour in a cubic foot of air, 5.03 grains.

Average mean weight of vapour in a cubic foot of air, between 1848 and 1854, 4.7 grains; excess or defect in 1854, + 0.3 of a grain.

Additional weight of vapour required to saturate a cubic foot of air, 1.17 grains.

Average additional weight of vapour required to saturate a cubic foot of air, between 1848 and 1854, 1.0 grain; excess or defect, in 1855, + 0.2 of a grain.

Degree of humidity, (complete saturation being 1.000,) 0.811.

Mean degree of humidity for August, from 1848 to 1854, 0.828; excess or defect in 1855 — 0.017.

Mean weight of a cubic foot of air, 523.9 grains.

Excess or defect of the mean weight of a cubic foot of air, in August, 1855, — 4.1 grains; the average of August between 1848 and 1854 being 528 grains.

Whole amount of water in a vertical column of the atmosphere 6.2 inches.

Average whole amount of water in a vertical column of the atmosphere for the last four years, 5.7 inches; excess or defect in August, 1855 + 0.5 of an inch.

(+ Is in excess of the mean, and — in defect of the mean.)

RESULT OF OBSERVATIONS
MADE AT THE BEESTON OBSERVATORY, IN AUGUST, 1855.

The greatest cold occurred on the 10th., the temperature descending to 40.1°; the greatest heat in shade on the 17th., namely 79.5°. The range of temperature for the month was 39.4°. The greatest heat on the 6th. only rose to 61°. The warmest night was the 31st., the temperature never descending below 59.1°.

The greatest cold of the wet-bulb was 40.1°, on the 10th.; and the greatest heat of the wet-bulb was 70.0°, on the 17th.; the monthly range of the wet-bulb thermometer being 29.9°.

The mean amount of ozone for the night in August was 3.2; and for the day 3.6; there was much ozone in the nights of the 2nd., 5th., 27th., and 28th., and in the days of the 1st., 2nd., 6th., 14th., 24th., and 25th.

Solar Halos occurred on the 18th., 25th., 26th., and 30th. Lunar Halos on the 27th. and 30th. A white fog in the valley on the 1st., 28th., 29th., 30th., and 31st. Between the 8th. and 16th., a great abundance of meteors.

AMOUNT OF RAIN FALLEN AT HIGHFIELD HOUSE, IN AUGUST, DURING THE PAST TWELVE YEARS.

1844,	2.3 inches,	1850,	1.0 inches,
1845,	4.8 "	1851,	2.1 "
1846,	3.3 "	1852,	3.3 "
1847,	1.4 "	1853,	4 3 "
1848,	4.8 "	1854,	1.4 "
1849,	1.7 "	1855,	1.1 "

DIRECTION OF THE WIND, AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN AUGUST, 1855.

1st.—SW and WSW till 2 p.m., then S; at 7h. 45m. p.m. became SSE, changing to SSW at 10h. 30m.

2nd.—SSW, being SW from 10h. 45m. p.m. till 11h. 30m. p.m.

3rd.—SSW till 10h. 30m. a.m., then SW.

4th.—SW till 6h. 15m. a.m., then W; became WSW at 12h. 30m. p.m.

5th.—WSW till 12h. 15m. a.m., then W; at 7h. 30m. became WNW, at 7h. 45m. p.m. NW, 8h. 30m. W, and 9 p.m. NW.

6th.—NW till 1h. 15m. a.m., then N; 5h. 15m. a.m. NNE, 6 a.m. ENE, 7 a.m. E, 8h. 30m. a.m. SE, 10h. 45m. a.m. ESE, 12h. 15m. p.m. E, 1h. 15m. p.m. ESE, 2h. 15m. p.m. SE and SSE, 7h. 45m. p.m. S, 8 p.m. SW and SSW, 11h. 15m. p.m. S, and 11h. 30m. p.m. SE.

7th.—SE and SSE till 12h. 30m. a.m., then S till 6h. 30m. a.m., then SW and SSW; 12h. 45m. p.m. S, 1h. 45m. p.m. SW, 5h. 15m. p.m. WSW, 7h. 15m. p.m. SW, and 9h. 15m. WSW.

8th.—WSW till 2h. 45m. a.m., then W till 9h. 15m. a.m., then WNW till 7h. 45m. p.m., then W.

9th.—WSW till 12h. 45m. a.m., then WNW till 12h. 30m. p.m., then NW till 4h. 15m. p.m., then WNW till 11 p.m., then W.

10th.—W till 3h. 15m. a.m., then SW till 6h. 30m. a.m., then W till 7h. 15m. a.m., then WSW till 8 a.m., then W till 8h. 30m. a.m., then WNW till 10 a.m., then W till 11h. 30m. a.m., then WNW till 2h. 30m. p.m., then NW till 3 p.m., then W and WSW.

11th.—WNW and NW till 5 a.m., then W till 7h. 15m. a.m., then SW till 1 p.m., then W till 2 p.m., then NW till 2h. 30m. p.m., then W.

12th.—W till 5h. 30m. a.m., then WNW till 10h. 45m. a.m., then NW till 11h. 30m. a.m., then NE till 1 p.m., then NW and NNW till 4 p.m., then NE till 4h. 45m. p.m., then NW.

13th.—WNW till 3h. 15m. p.m., then NW till 7h. 45m. p.m., then WNW.

14th.—WNW till 1h. 30m. a.m., then W till 2h. 45m. p.m., then WSW till 7h. 45m. a.m., then W and WNW.

15th.—W till 3h. 30m. a.m., then WSW till 5 a.m., then W till 8h. 15m.

a.m., then WNW, except at 8h. 45m. p.m., when the wind moved from NW through the N, E, and S, to W, becoming again WNW.

16th.—W till 2 a.m., then SW till 3h. 30m. a.m., then WSW till 7 a.m., then WNW till 2h. 15m. p.m., then NW till 2h. 30m. p.m., then N till 2h. 45m. p.m., then NW for fifteen minutes, then NE and NNE till 4h. 15m. p.m., then WNW till 11 p.m., after which W.

17th.—W till 7h. 30m. a.m., than WSW till 8h. 15m. a.m., then S and SSW till 9h. 15m. a.m., then S and SSE till 10 a.m., then SW and SSW till 3h. 15m. p.m., then W and WSW till 4h. 30m. p.m., then SW and SSW till 10h. 15m. p.m., then W and WSW till 11h. 45m. p.m., then SW.

18th.—SW till 2 a.m., then WSW till 9 a.m., then SW till 9h. 15m. a.m., then SSE till 9h. 45m. p.m., then E till 11h. 45m. p.m., then SE.

19th.—SE till 1 a.m., then SSE till 2h. 45m. a.m., then S till 3h. 15m. a.m., then SSE till 4h. 30m. a.m., then SE till 5 a.m., then ESE till 5h. 45m. a.m., then E till 7 a.m., then SSE till 7h. 15m. a.m., then S till 8h. 15m. a.m., then SSW till 11h. 15m. a.m., then WSW till 1h. 15m. p.m, then W till 1h. 30m. p.m., then WNW till 3 p.m., then W till 4h. 15m. p.m., then WSW till 7h. 15m. p.m., then SW.

20th.—WSW till 3h. 30m. a.m., then W till 10 a.m., then SW till 4h. 30m. p.m., then W till 8 p.m., then SW.

21st.—SW and WSW till 11 p.m., then W.

22nd.—W and WSW till 10 a.m., then SW till 1h. 45m. p.m., then W till 2h. 45m. p.m., then NW.

23rd.—NW till 6 a.m., then NNW till 6h. 30m. a.m., then N till 8h. 15m. a.m., then NNE till 8h. 45m. a.m., then NE till 9h. 15m. a.m., then E till 12h. 15m. p.m., then ENE till 3 p.m., then E and ENE.

24th.—E and ENE till 1h. 30m. a.m., then NE till 3h. 15m. a.m., then E till 6h. 45m. a.m., then ESE till 7 a.m., then SE till 7h. 45m., a.m., then S till 8 a.m., then SSW till 4h. 45m. p.m., then SW, becoming S at 11h. 45m. p.m.

25th.—SW till 10h. 45m. a.m., then SSW till 10 p.m., then SW.

26th.—SW till 2h. 45m. a.m., then WSW till 1h. 30m. p.m., then W till 6h. 15m. p.m., then WSW till 9h. 45m. p.m., then SW.

27th.—SW till 1h. 30m. a.m., then SSW till 2 a.m., then S till 10 a.m., then SSW.

28th.—S till 3h. 15m. a.m., then SSE till 4h. 15m. a.m., then S till 5h. 30m. a.m., then SE and SSE till 7h. 15m. a.m., then S till 8h. 45m. a.m., then SW.

29th.—SW till 2h. 45m. a.m., then W till 11 a.m., then WNW till 10h. 45m. p.m., then W.

30th.—W till 8h. 15m. a.m., then NNW; at 8h. 30m. a.m. N, at 8h. 45m. a.m. NE, at 9h. 15m. a.m. ESE, at 9h. 30m. a.m. E, at 11 a.m. SSE, at 11h. 15m. a.m. SSW, at 11h. 30m. a.m. SSE, at 11h. 45m. a.m. E till 4 p.m., when S and SSE till 7h. 15m. p.m., then E till 9h. 30m. p.m., then ENE till 11 p.m., then NE.

31st.—NE and NNE till 5h. 15m. a.m., then N till 5h. 30m. a.m., then NW till 9 a.m., then NNW till 9h. 15m. a.m., then SE till 11 a.m., then E till 11h. 15m. a.m., then SSE till 1h. 30m. p.m., then SSW for ten minutes, and again SSE till 4h. 15m. p.m., when SE, becoming ESE at 4h. 30m. p.m., E at 7h. 15m. p.m., NE at 7h. 30m. p.m., ENE at 7h. 45m. p.m., N at 8h. 15m. p.m., NW at 8h. 30m. p.m., NNE at 8h. 45m. p.m., N at 9 p.m., NE at 9h. 30m. p.m., NNE at 9h. 45m. p.m., N at 10 p.m., and NW at 10h. 45m., remaining in that quarter.

FORCE OF THE WIND, AS MARKED BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, DURING AUGUST, 1855.

1st.—Calm till 9 a.m., then 4 oz. to 1 lb. 5 oz. till 12h. 30m. p.m., then not exceeding 4 oz. till 3h. 15m. p.m., then from 4 oz. to 1 lb. 10 oz., the greatest force being at 4h. 15m. p.m.

2nd.—Not exceeding 3 oz. till 5h. 30m. a.m., then mostly 1 lb. 5 oz. till 10h. 30m. a.m., then increased to 1 lb. 8 oz., being 1 lb. 14 oz. at 3h. 15m. p.m., moderating at 5 p.m., except between 6h. 45m. and 8 p.m., when from 8 oz. to 1 lb. 7 oz.

3rd.—Not exceeding 5 oz. till 6h. 45m. a.m., then 1 lb. 5 oz. to 1 lb. 7 oz. till 8h. 30m. a.m., then 1 lb. 7 oz. to 1 lb. 12 oz. till 9h. 45m. a.m., then 1 lb. 6 oz. to 2 lb. 11 oz. till 4h. 30m. p.m., then 9 oz. till 7 p.m., then 1 oz. to 4 oz.

4th.—Not exceeding 4 oz. till 6h. 15m. a.m., then chiefly 1 lb. 4 oz. to 2 lb. 4 oz. till 2h. 15m. p.m., being 2 lb. 12 oz. at 11 a.m., then varying from 4 oz. to 1 lb. 5 oz. till 7h. 30m. p.m., after which not exceeding 4 oz.

5th.—Nearly calm till 7h. 30m. a.m., then 8 oz. to 1 lb. 6 oz. till 1h. 15m. p.m., then 4 oz. to 6 oz. till 5h. 15m. p.m., then nearly calm.

6th.—Not exceeding 3 oz.; mostly calm.

7th.—Nearly calm, except at 4 p.m., when 11 oz.

8th.—Calm till 9h. 30m. a.m., then 3 oz. to 7 oz. till 1 p.m., then 1 lb. to 1 lb. 9 oz. till 3h. 30m. p.m., then 4 oz. to 1 lb. 5 oz. till 5h. 30m. p.m., after 7 p.m. nearly calm.

9th.—Mostly 4 oz. till 9 a.m., then 1 lb. 3 oz.; 9h. 15m. a.m. 1 lb. 7 oz., then 4 oz. till noon, then 9 oz. to 1 lb. 6 oz. till 1h. 30m. p.m., then 4 oz. till 5h. 30m. p.m., after which calm.

10th.—Calm.

11th.—Calm.

12th.—Nearly calm, never exceeding 5 oz.

13th.—Calm till 9h. 30m. a.m., then 4 oz. till 4h. 15m. p.m., except at 1 p.m., when 10 oz., from 4h. 30m. calm.

14th.—Not exceeding 4 oz. till 10 a.m., then mostly 4 oz. till 5 p.m., except at 11 a.m., when 1 lb. 10 oz., and at 11h. 15m. a.m, when 1 lb. 5 oz.; after 5 p.m. 1 oz. to 5 oz.

15th.—1 oz. to 5 oz. till 1 p.m., then 4 oz. to 8 oz. till 2h. 45m. p.m., then 5 oz. to 1 lb. 6 oz. till 4h. 30m. p.m., then 4 oz. till 6 p.m., then calm.

16th.—Calm till 7h. 30m. a.m., then 4 oz. till 1h. 15m. p.m., then 1 oz.

17th.—Not exceeding 1 oz.

18th.—Calm till 10 a.m., then 4 oz. to 7 oz. till 2h. 30m. p.m., then not exceeding 3 oz.

19th.—Calm till 9h. 45m. a.m., then 4 oz. till 10h. 45m. a.m., then 1 lb. 5 oz. to 1 lb. 12 oz. till 1h. 45m. p.m., then 4 oz. till 2h. 30m. p.m., then 1 lb. 7 oz. for half an hour, then 4 oz. till 4 p.m., then 1 lb. 5 oz. to 1 lb. 12 oz. till 5h. 30m. p.m., then nearly calm till 8h. 15m. p.m., then 9 oz. to 1 lb. 13 oz. till 9h. 30m. p.m., then 4 oz. to 8 oz.

20th.—1 oz. to 4 oz. till noon, then 8 oz. to 1 lb. 9 oz., till 3 p.m., then 4 oz. till 5h. 15m. p.m., then 5 oz. to 1 lb. 2 oz. till 6 p.m., then mostly 4 oz. till 10 p.m., then 8 oz. to 1 lb. 7 oz.

21st.—4 oz. to 8 oz. till 1h. 45m. a.m., then 1 lb. 5 oz. to 1 lb. 14 oz. till 4 a.m., then 7 oz. to 1 lb. 9 oz. till 6h. 15m. a.m., then 1 lb. 12 oz. for half an hour, at 7 a.m. 2 lb. 13 oz., then 1 lb. 14 oz. till 8 a.m., 2 lb. 14 oz. for thirty minutes, 8h. 45m. 3 lb. 3 oz., then 2 lb. 13 oz. till 11 a.m., then 1 lb. 14 oz. till noon, then 1 lb. 10 oz. to 2 lb. 12 oz. till 5 p.m., then 10 oz. to 1 lb. 5 oz. till 7h. 15m. p.m., then 5 oz. till 9 p.m., then 1 lb. 4 oz. for thirty minutes, after which from 1 oz. to 6 oz.

22nd.—1 oz. to 4 oz. till 9h. 30m. a.m., then 4 oz. to 10 oz. till 11h. 15m. a.m., then mostly between 10 oz. and 1 lb. 6 oz. till 1h. 30m. p.m., 4 oz. till 3 p.m., then calm.

23rd.—Calm till 12h. 30m. p.m., then 1 oz. to 4 oz.

24th.—Calm till 9h. 30m. a.m., then 1 oz. to 9 oz. till 12h. 45m. p.m., at 1 p.m. 2 lb. 8 oz., then chiefly from 1 lb. to 1 lb. 12 oz. till 5h. 30m. p.m., then 4 oz. to 8 oz. till 9 p.m., then 1 to 3 oz.

25th.—1 oz. to 5 oz. till 2h. 30m. a.m., then calm till 7h. 30m. a.m., then 4 oz. to 9 oz. till 8h. 30m. a.m., then 9 oz. to 1 lb. 6 oz. till 11 a.m., then 1 lb. 5 oz. to 1 lb. 13 oz. till 4h. 30m. p.m., then constant changes from 1 oz. to 1 lb. 5 oz.

26th.—1 oz. to 4 oz. till 9 a.m., then 8 oz. to 1 lb. 7 oz. till noon, then varying from 4 oz. to 1 lb. 5 oz. till 5h. 30m. p.m., then mostly calm.

27th.—Calm till 2 a.m., then 4 oz. to 8 oz. till 7 a.m., then 8 oz. to 1 lb. 8 oz. till 8h. 30m. a.m., then 2 lb. 6 oz. for thirty minutes, then 1 lb. 7 oz. to 1 lb. 12 oz. till 1h. 15m. p.m., then 2 lb. for an hour, then 1 lb. 5 oz. to 1 lb. 12 oz. till 5 p.m., then varying from 4 oz. to 1 lb. 8 oz.

28th.—4 oz. till 3h. 15m. a.m., then calm till 7 a.m., then 2 to 5 oz. till 8 a.m., then 4 oz. to 1 lb. 6 oz. till 10h. 15m. a.m., then 4 oz. till 12h. 30m. p.m., then 4 to 8 oz. till 2 p.m., then 4 oz. till 5h. 30m. p.m., then calm.

29th.—Calm till 8h. 30m. a.m., then 1 to 4 oz. till 5h. 30m. p.m., after which calm.

30th.—Calm.

31st.—Calm till 12h. 30m. p.m., then 1 oz. till 7h. 45m. p.m., then calm.

ELECTRICITY AT THE BEESTON OBSERVATORY, DURING AUGUST, 1855.

1st.—Positive till 10 a.m., then negative. Positive at 11 p.m.; feeble.

2nd.—Positive till 10 a.m., then negative. Positive at 11 p.m.; feeble.

3rd.—Negative till 2 p.m., then positive; feeble.

4th.—10 a.m., positive. 11 p.m., negative; feeble.

5th.—1 a.m., negative, after which positive; rather stronger.

6th.—Positive; feeble.

7th.—Positive; feeble, except from 6h. 15m. p.m., and 7h. 45m. p.m., when powerful.

8th.—Positive; feeble.

9th.—Positive; feeble.

10th.—10 a.m., negative. 11 p.m., positive; feeble.

11th.—10 a.m., negative. 11 p.m., positive; feeble.

12th.—Positive; feeble.

13th.—Positive; feeble.

14th.—7 a.m., positive. 10 a.m., negative. 11 p.m., positive; rather feeble.

15th.—Positive; feeble.

16th.—Positive till 10 a.m., then negative. 11 p.m., positive; feeble.

17th.—10 a.m., negative. 11 p.m., positive; feeble.

18th.—Positive; feeble.

19th.—Positive; feeble, except from 12h. 30m. a.m., till 2 a.m., when gold leaves struck the sides of the Electrometer.

20th.—Positive; feeble.

21st.—7h. 15m. a.m., positive, in five minutes struck side negative; tolerably strong. 11 p.m., positive.

22nd.—Positive till 10h. 10m. a.m., then negative; became positive at 6 p.m.; rather feeble.

23rd.—Positive; feeble.

24th.—Positive till 10 a.m., then negative. 11 p.m., positive; rather feeble.

25th.—Positive till 5 p.m., then negative. 11 p.m., positive; feeble.

26th.—Positive; feeble.

27th.—Positive; feeble.

28th.—Positive; feeble.

29th.—Positive till 10 a.m., then negative. 11 p.m., positive.

30th.—Positive till 10 p.m., then negative. 11 p.m., positive.

31st.—Positive till 10 a.m., then negative. 11 p.m., positive.

On the 7th., at 4h. 30m. p.m., thunder in SE. 5 p.m., very black in W, with frequent thunder. At 6 p.m., storm in SW, having moved in a NW current. At 6h. 30m. p.m., the storm had changed its course, moving in a SW current, along SE horizon, occasional lightning. 6h. 50m., lightning in SSE, but not nearer than four miles, suddenly a strong brimstone smell which lasted two minutes, and was perceived by several persons, rain falling at the time. From 7 p.m. till 7h. 30m. much lightning in SSE and SE, the nearest flashes being four miles and a half off; they were purple in colour. Electricity mostly negative, but changed repeatedly to positive. From 10 p.m. till 11 p.m. lightning in E.

On the 19th. at 2 a.m. lightning in NE.

On the 23rd. from midnight till 2 a.m. vivid lightning in W and SW, averaging two flashes in three minntes. Thunder just audible. Occasional lightning also in SE, NE, and N.

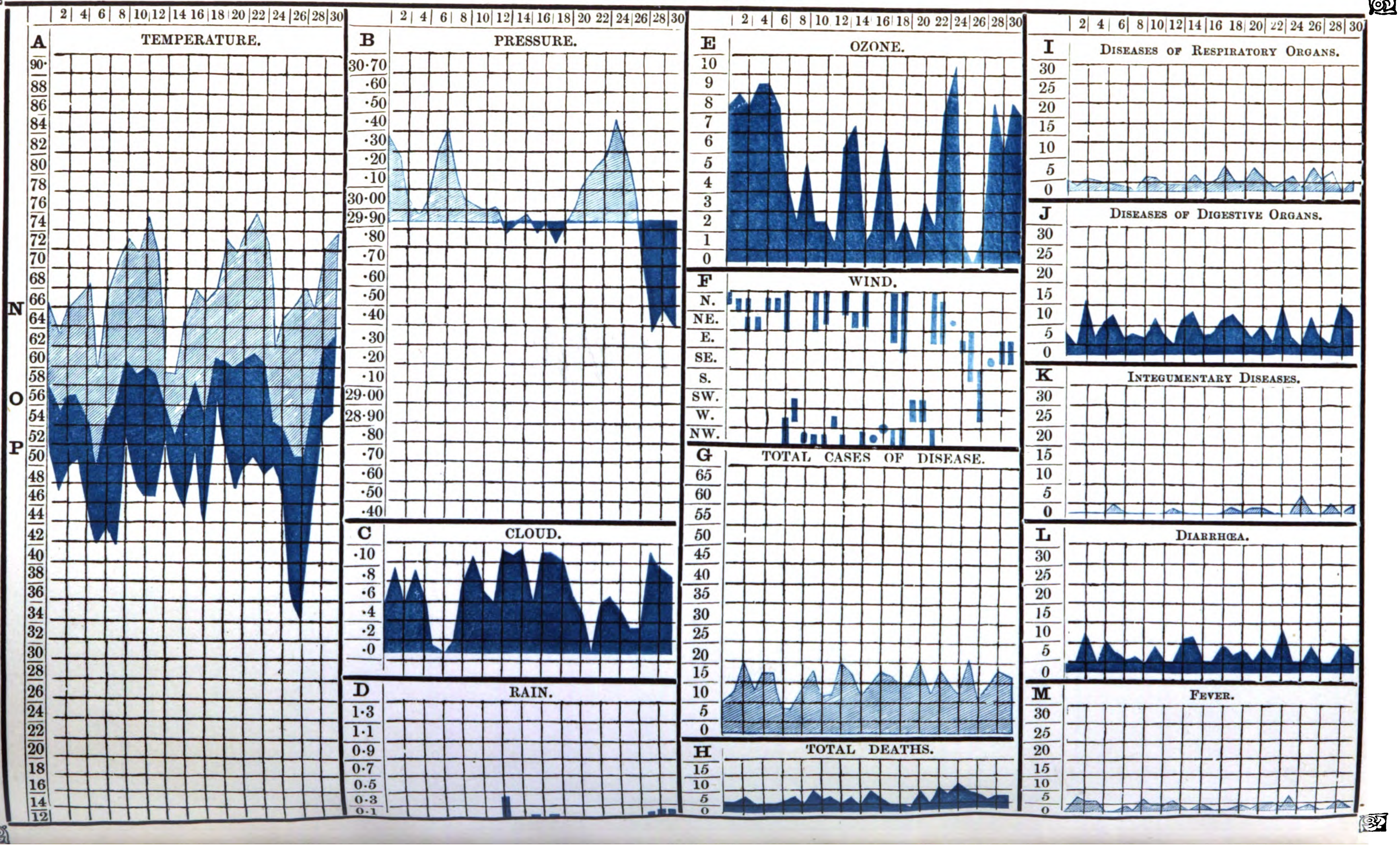
AMOUNT OF RAIN FALLEN IN VARIOUS LOCALITIES, DURING THE MONTHS OF APRIL, MAY, AND JUNE, 1855, FROM THE REGISTRAR GENERAL'S OBSERVERS.

Locality.	Amount of Inches.	Rainy days.
Jersey,	5.1	26
Guernsey,	6.1	29
Helston,	8.4	33
Falmouth,	9.6	35
Truro,	8.3	33
Teignmouth,	5.3	37
Exeter,	7.7	41
Ventnor,	4.0	33
Newport,	3.3	31
Ryde,	3.0	21
Clifton,	6.2	41
Bexley Heath,	2.6	26
Lewisham,	2.6	27
Royal Observatory,	2.6	25
St. Thomas Hospital, London,	2.6	21
St Mary's Hospital, London,	3.2	28
St. John's Wood,	3.9	30
Enfield,	3.1	18
Great Berkhampstead	5.3	29
Rose Hill, near Oxford,	4.4	40
Bicester,	3.7	28
Oxford,	4.6	34
Hartwell House, near Aylesbury,	3.6	33
Hartwell Rectory,	3.5	37
Eign,	5.4	37
Knebworth	3.5	29
Royston,	4.2	55
Cardington, (Beds.,)	4.7	29
Lampeter,	8.3	47
Worcester,	4.9	33
Norwich,	4.3	25
Belvoir Castle,	4.9	32
Grantham,	4.6	35
Boston,	3.9	31
Derby,	5.2	39
Holkham,	3.8	27
Nottingham,	5.3	41
Hawarden, near Chester,	4.9	27
Gainsborough,	4.0	39
Warrington,	5.9	36
Liverpool,	4.8	31
Manchester,	5.7	42
Wakefield,	4.8	54
Leeds,	4.3	32
Stonyhurst,	9.8	36
York,	3.1	25
Isle of Man,	4.5	34
Whitehaven,	6.3	25
North Shields,	7.7	41
West Anstruther,	4.1	26
Arbroath,	3.8	26
Elgin,	5.1	30
Stornoway Light-House.	4.3	34

METEOROLOGICAL TABLE FOR AUGUST, 1855,
FROM OBSERVATIONS RECORDED AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

Day of the Week.	Day of the Month.	Mean Pressure of the Barometer.	Temperature of the Air.					Force of Wind.	General Direction of the Wind.	Amount of Ozone.		Amount of Rain.	Amount of evaporation	Temp. of evaporation
			Highest.	Lowest.	Range.	Lowest on Grass.	Adopted Mean.			In the night.	In the day.			
		Inches.	Deg.	Deg.	Deg.	Deg.	Deg.	0–6		0–10	0–10	Inches.	Inches.	Deg.
W	1	29.611	70.3	47.0	23.3	44.8	60.0	1.3	SW. & S.	0	7	0.024	0.092	57.0
T	2	.567	72.0	55.8	14.6	49.2	61.3	1.2	SSW. & S.	7.5	7	.003	0.152	55.8
F	3	.479	71.0	54.1	16.9	50.0	61.0	1.6	SW. & S.	4	0		0.233	57.0
S	4	.498	67.6	52.7	7.5	50.8	59.0	1.4	WSW. & SW.	4	0	.080	0.248	56.4
S	5	.854	68.8	46.4	22.4	43.0	56.8	0.5	WNW. & NW.	3	1		0.135	52.7
M	6	.879	60.5	46.0	14.5	40.8	55.9	0.3	SE. & SSE.	0	7	.260	0.180	53.5
T	7	.542	74.0	55.8	18.2	53.4	62.6	0.4	SSW. & SW.	7	3	.207	0.065	60.8
W	8	.517	69.1	55.0	13.9	52.9	60.6	0.5	WNW.	0	3	.003	0.075	58.0
T	9	.720	68.7	50.0	18.7	51.0	57.8	0.6	NW.	6	3.5		0.155	53.8
F	10	.956	71.6	40.7	30.9	36.8	58.3	0 1	NW.	0	3		0.160	54.8
S	11	30.056	77.0	58.8	18.4	55.2	67.2	0.1	NW.	3	6		0.205	64.6
S	12	.100	75.1	54.2	20.9	60.3	61.3	0.2	NW.	5.5	7	.004	0.145	58.6
M	13	.101	68.8	48.0	20.8	45.6	57.7	0.3	NW.	4	7		0.160	54.3
T	14	.051	74.2	49.9	24.3	45.0	61.8	0.7	NW.	5	6		0.150	59.2
W	15	.112	77·3	50.7	26.6	46.8	63.1	0.6	NW.	3	5.5		0.164	58.4
T	16	.153	74.9	53.1	21.8	47.8	62.6	0.3	NW.	4	2		0.210	58.2
F	17	.109	81.2	49.0	32.2	44.6	65.1	0.2	SW. & S.	3	5		0.178	60.6
S	18	29.837	80.2	54.9	25.3	49.5	66.7	0.5	SSW. & SE.	2.5	7		0.220	62.4
S	19	.510	73.0	58.8	14.2	54.7	64.7	1.1	SSW. & NW.	7.5	1	.012	0.272	61.6
M	20	.565	71.3	54.2	17.1	50.7	61.4	0.9	W. & WSW.	5	0	.124	0.161	58.5
T	21	.643	71.7	55.8	15.9	52.2	61.6	1.5	NW. & SW.	2	1	.002	0.217	58.8
W	22	.828	68.8	50.6	18.2	47.3	58.2	0.4	SW. & W.	2	1		0.222	55.6
T	23	.687	65.9	49.7	16.2	44.8	57.1	0.4	WNW. & E.	3	5	.115	0.105	55.9
F	24	.598	71.8	57.6	14.2	54.8	63.1	0.7	SSW. & SW.	3	1	.110	0.037	60.9
S	25	.776	70.4	49.2	21.2	46 4	61.9	1.2	SSW. & W.	2	6	.042	0.145	59.5
S	26	.864	68.8	47.5	21.3	45.0	57.5	0.8	W. & S.	2	2		0.192	55.0
M	27	.666	68.8	49.6	19.2	44.0	60.1	1.8	SW.	7	7	.012	0.197	58.3
T	28	.624	71.1	50.4	20.7	47.0	59.8	0.6	SSW. & S.	6 5	0		0.102	57.3
W	29	.928	71.0	47.0	24.0	41.3	57.0	0.2	NW. & W.	2.5	1.5		0.152	54 6
T	30	30.134	73.6	41.3	32.3	36.8	57.3	0.2	W. & E.	3.	7.5		0.148	54.8
F	31	.107	76.3	49.6	26.7	42.8	61.7	0.4	SE. & E.	2.	6.5		0.138	59.3

SEPTEMBER, 1855.



ON THE HURRICANES OF THE SOUTH PACIFIC OCEAN.

BY THOMAS DOBSON, ESQ., B.A.

(Continued from page 57.)

ALL the facts that I have met with in my investigation of the storms of the South Pacific Ocean, tend to shew that a continuous storm-track extends from the neighbourhood of Torres Straits to the Navigator's Islands, or Samoa, in an easterly direction, and thence to Rarotonga and Mangaia, in a south-easterly direction. This forms an exact counterpart to the track, from Java to the Mauritius, of the Hurricanes of the Southern Indian Ocean.

It is highly probable that future observation will confirm my conjecture, that the volcanic region around Torres Straits is the common starting-place of both classes of Cyclones.

The hurricane met with off Mangaia, in December, 1842, by H.M.S. Favorite, was of this class. For the following account of its passage over Upolu, the principal island of the Navigator's group, I am indebted to the Rev. W. Day, who kindly copied it for me from his private journal, written at Sagano, about six miles west of Apia, Upolu.

"Before daylight of the 15th. December, 1842, the wind set in from the NE. Before 10 a.m. the natives, who are familiar from childhood with these hurricanes, urged us to leave the house. We took refuge in the village in a low hut, which they nearly buried in bread-fruit branches, to break the fury of the wind. Trees were falling around us in our way to the village. Towards afternoon the storm abated, and the rain fell in torrents. During the hurricane the wind came on in blasts, and got round from NE to SE by S. Great devastation was done in the grounds around our dwelling. The trees had been prostrated in very opposite directions. The storm raged extensively on the islands of Upolu and Savaii, throwing down many of the largest native houses and chapels. An American Whaler has been in since the storm. The captain states that he encountered it when about two hundred miles distant, blowing from the west—at the same hour that it blew hardest here."

The shift of wind from NE to SE by S shews that the Cyclone was progressing towards the south-east; which is confirmed by its appearance on the following day off Mangaia, where it was met by H.M.S. Favorite, which left Tahiti for Sydney on the 11th. of December. In the following extract from the log of the Favorite, the want of barometrical observations is, in some degree, compensated by the recorded force of the wind, the maximum of the scale of intensity being 12, as usual.

"1842, December 16th., a.m. (b.c.,) wind N. 4 a.m., wind N by E, set royals. Noon, 20° 42′ S, 204° 9′ E. Mangaia S 59° W, 145 miles. P.M., wind (4) NNW. 8 p.m. *wind NE, in studding sails.* Saturday 17th., a.m., wind NE, (6.) 5h. 30m., saw Mangaia, SW ½ W. 7h 45m. a.m. hove to. Mangaia, NNW, one mile off shore. 10 a.m., wind ENE, (6.) P.M. wind ENE (7,) split mainsail. 4 p.m. wind ENE (12.) 8 p.m. wind S by W (12.) Carried away main-staysail, battened down hatches, lost first gig, a man drowned, jib blew to pieces, driver split. 12 p.m., wind WSW (12.) Sunday 18th. Wind W (10.8.) 3 a.m. wind NNW, (4.) Noon, W by N, (5.) 1 p.m. wind W, (5.) 5 p.m., wind WSW, (5.) 11 p.m. wind W, (3.) Out reefs."

The first indication of the Cyclone here, is at 8 p.m. of the 16th., when the wind shifts to NE, just as it had done on the morning of the preceding day at Samoa. The track of the centre lay to the NE of the ship. The central area passed over the ship between 4 and 8 p.m. of the 17th., when the wind was of hurricane violence, (12,) and shifted from ENE to S by W.

A writer in the "Nautical Magazine" for 1845, page 425, overlooking these indications, and perhaps misled by a supposed analogy in form between the storm-tracks of the Pacific and Indian Oceans, has decided that this Cyclone was progressing towards the south-west. Captain Stokes, who was at Sydney when the Favorite arrived from Tahiti, has fallen into the same error.

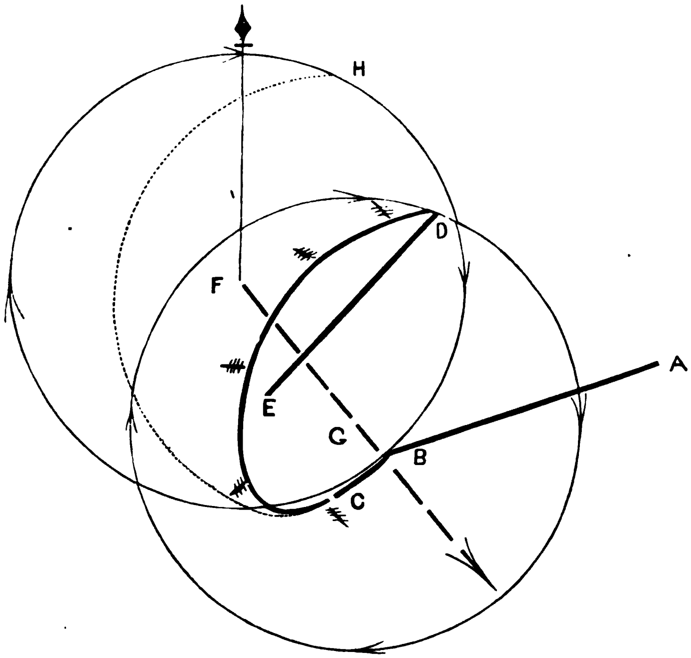
The following particulars and remarks are given by Captain Stokes, at page 441, vol. ii, of the voyage of the Beagle.

> "At noon of the 17th. December, 1842, the Favorite was in 21° 58′ S, and 158° 2′ W. Mangaia distant five miles, SW by W. Steering W by S ½ S, in a moderate gale from ENE, with cloudy rainy weather; 3 p.m., had run twenty-seven miles, wind having increased to a strong gale, veering to NE; course now SW. At the end of another hour, having run eight miles, wind increased to a storm, veering again to eastward; ship brought to the wind, on port tack under a main-trysail. For the hours 5 and 6, she headed from S to SW, which would give the direction of the wind about SE by E. At 6h. 30m. a man washed away with the lee-quarter boat. At 8 the wind had veered to S by W, having blown a hurricane with constant rain for the last hour. At 9, most of the half ports were washed away, the sea making a clean sweep over the decks. By midnight the wind had subsided to a whole gale, but still the veering had reached the WSW point; and at 3 next morning it was blowing only a moderate breeze from WNW, with tolerably clear weather. Sail was now made, and a SW by S course held for twenty-eight miles, when, at noon, observation gave 22° 1′ S, and 158° 44′ W. The day after the hurricane the wind was moderate from westward; and the day before, moderate from northward. The ship's position at noon on the day before the hurricane, was about one hundred and thirty miles to the NE by E of Mangaia. The duration of this storm, then, may be considered to have been from 4 p.m. to midnight, in which eight hours the wind had veered gradually from E round by S to WSW. The veering being much more rapid between 8 and 9 p.m., when the storm was at its height, the ship must at that time have been near the focus. The tack on which the Favorite was hove to carried her into the course of the hurricane, or rather, placed her in a position to be overtaken by it, as it passed along *to the southward and westward.* But as the ship broke off to the westward and northward, she fell out of its north-western edge. Doubtless, if a WNW course had been pursued in the first instance, or at noon on the 17th., the Favorite would have avoided the storm. It is to be regretted that the barometer was broken in the commencement of the hurricane, when it was unusually low, having been falling for some time beforehand. Besides this, there was ample warning in the unusually gloomy lurid appearance of the sky; the weather also was misty, with showers of rain, as the ship approached the course of the storm."

The data given in this extract are at variance with the interpretation which Captain Stokes has put upon them. Since the wind veered gradually from E round to S and WSW, the progressive motion was towards the S by E. But it will be observed that the veering is continuous from NE, round by E, S, and W, to WNW, that is, through nearly three-fourths of the points of the compass; and it will be instructive to seek an explanation of this fact.

On a chart, mark the point A in 21° 58′ S, and 158° 2′ W. Draw

AB = 27 miles, in the direction W by S ½ S; and BC = 8 miles, in a SW direction. Mark another point E in 22° 1′ S, and 158° 44′ W, and draw ED = 28 miles, to the NE. Then A is the position of the Favorite at noon of the 17th.; C, her position when she hove to; and D, her position when she again made sail. While sailing from the NE to A the wind was northerly; at B it was NE; veered to the eastward at C with a falling barometer. The wind along BC being NE, the centre is at some point F to the NW of the ship. When the ship was at D, the wind was WNW, and therefore the centre lay to the SSW of D, at some point G. If the Cyclone had been stationary at F, and the ship while hove to, had drifted along the dotted line to H, she would have met with the same changes of wind as she actually experienced in passing from C to D. The ship, although hove to, really drifted from C to D, *round* the advancing centre of the Cyclone, urged by the revolving wind and the radial swell.



This drift round the centre, of a ship hove to in a hurricane, explains the statement that "the wind veered all round the compass," which is so often met with in accounts of hurricanes at sea; and also shews that it is unnecessary to suppose that the track of the Cyclone was recurving abruptly, as some writers on Cyclonology have done in cases where the wind has shifted through more than sixteen points.

(To be continued.)

THE WONDERS OF THE ATMOSPHERE; A POPULAR TREATISE ON METEOROLOGY.

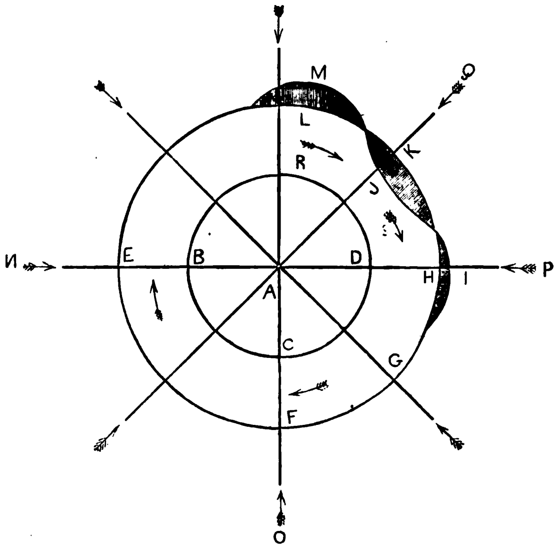
BY EDWARD JOSEPH LOWE, ESQ., F.R.A.S., ETC.

(*Continued from page* 61.)

The atmospheric pressure on the whole extent of the earth is very great, being no less than 11,449,000,000 hundreds of millions of pounds weight. Dr. Prout, from experiment, found that, at a temperature of 60° and at a pressure of 30 inches of mercury, (as shewn by the barometer,) 100 cubic inches of pure dry air weighed rather more than 31 grains.

When we see the barometer rise or fall, we must not suppose that the atmosphere has *gained* or *lost* weight, but merely that so much pressure has been gained or lost in that particular locality; in short, the same whole pressure is constantly maintained; for, if the barometer falls in one place, that fall must produce a rising barometer in another locality. It should be borne in mind, that although the barometer points out the actual *downward* pressure of the atmosphere, yet its changes are due to *lateral* displacements of air.

The following diagram will perhaps illustrate this clearly. Let BCD represent the earth, and A the earth's centre; and let EFGHKL represent the mean pressure of the atmosphere. Now, it at once becomes apparent that the attraction of gravity will cause the atmosphere to press from all sides of the earth towards the centre A. Thus the atmosphere in the situation of the arrow N will press towards the centre in the direction EBA, the



air near O in the direction FCA, near P in the direction HDA, and at Q in the direction KJA, and in like manner, the arrows outside the circle will all shew the direction of pressure. Let the barometer at the position K fall considerably, so as to alter the atmospheric pressure from KA to JA; this alteration will not be due to any change in the pressure from above, but will be owing to an action taking place at right angles to this force, as shewn by the arrows RS, etc., and this internal cause, within the atmosphere itself, in removing a certain amount of pressure near K, will necessarily add to the pressure in another locality, as at H and L, increasing the pressure at I and M, at which places the barometer will rise and indicate a greater pressure.

The weight of the atmosphere is the combined pressure of the *gases*, and the *elastic force of vapour* contained in the air; so that, if from any cause the gaseous atmosphere were destroyed, there might yet be an aqueous atmosphere; although, under these altered circumstances, life could not be supported. This atmosphere, in hot countries, would be held in the condition of invisible vapour, consequently the equatorial skies would be cloudless; but on receding from the equator towards colder regions, clouds would appear; and in the temperate zone, in which Great Britain is included, and in the Polar regions, the sky would be overcast, and there would be incessant falls of rain or snow. There is one remarkable difference between the gases or *dry* air, and the vaporous or *wet* air; the dry air flows from the cold to the warm regions, whilst the wet air flows from the warm to the cold. These two atmospheres so well mingled together, are borne along to great distances; and the latter is only precipitated in the form of rain, hail, or snow, when an atmosphere is entered which is much colder than that which involves them. We are enabled to separate the weight of dry air from that of moist air, and by calculation, find that with the mean height of the barometer in round numbers at 29½ inches, 29 inches will be due to dry air, and only half-an-inch to that of wet air. The barometer has a range of from two to three inches, considerably more than the whole pressure of the water contained in the air, consequently its changes cannot be due to the approach or absence of rain.

The tension or elastic force of aqueous vapour varies at different temperatures, and more especially when the atmosphere is hot. The tension increases with an increase of heat, as the following brief illustrations will shew:—

At a temp. of Deg.	Tension. inches.	At a temp. of Deg.	Tension. inches.
0	0.061	50	0.073
10	0.089	60	0.523
20	0.129	70	0.727
30	0.186	80	1.001
40	0.264	90	1.368

The weight of vapour, (given in grains troy,) in a cubic foot of air completely saturated also increases with an increase of heat, thus:—

At a temp. of	10°	it is	1.1	grains,
“ “	20	“	1.6	“
“ “	30	“	2.2	“
“ “	40	“	3.1	“
“ “	50	“	4.3	“
At a temp. of	60°	it is	5.9	grains,
“ “	70	“	8.0	“
“ “	80	“	10.8	“
“ “	89	“	14.1	“

The following brief table will further illustrate the changes that take place at different temperatures, in the weight of a cubic foot of air saturated with moisture, with a pressure of the barometer of 30 inches; and also the increase in weight of a cubic foot of *dry* air over that of one saturated with moisture, under the same pressure.

At a temp. of	The weight of a cubic foot of saturated air is	The excess of a cubic foot of dry air over that of saturated air is
32°	561.6 grains, troy,	1.4 grains, troy,
40	552.0 “ “	1.8 “ “
50	540.2 “ “	2.4 “ “
60	528.6 “ “	3.3 “ “
70	517.2 “ “	4.5 “ “
80	507.7 “ “	6.1 “ “
90	494.3 “ “	8.0 “ “

It will not be assumed, that because the elastic force of vapour increases with an increase of heat, that in summer the air is more moist than it is in winter; on the contrary it is drier, because the air is capable of holding more moisture with an increase of heat, beyond that which it is capable of doing at lower temperatures, without increasing the hygrometrical state of the air; or, in other words, in hot weather it requires much more water to saturate the air, in order that rain may fall, than it does in cold weather; this, however, will be more fully explained as we proceed.

It will be apparent to every one that all exhalations from the earth, be they poisonous or otherwise, pass into the air; but these are either, by a beautiful law of providence, so light that they move quickly to the upper regions, or are otherwise speedily absorbed by water, or become the food of plants. The large amount of oxygen in the air is sufficient to ensure the oxidation of miasmata of swamps, odoriferous principles of plants, and animal putrefaction, for these are very rapidly converted into water, carbonic acid, or nitric acid, and speedily enter into harmless combinations, leaving the air in a pure state.

The vastness of the waves of the atmosphere is but little conceived; imagine them as wide as the Atlantic Ocean, tossing about like those of the sea; one of this stupendous size was actually passing over England from the 1st. to the 18th. of February, 1849, (and this was of course pointed out to us by the barometer,) the mean reading during which period was more than half-an-inch above the average pressure; and when the crest of the wave was moving over Greenwich, the reading of the barometer, (reduced to the level of the sea,) was the extraordinary height of 30.90 inches. It appears from observations made by W. C. Bond, Esq., the astronomer of the Cambridge Observatory, in the United States, that when the crest was over Greenwich the base of the wave was then just equal to the distance between England and America; for on the very same day that it completed its passage over Greenwich, it was first felt at Boston, in the United States; and it occupied the same time passing over Boston as it did over Greenwich, namely seventeen days. Its daily motion was one hundred and seventy miles, or rather more than seven miles an hour. The readings of the barometer during its passage over Boston, were identical with the readings during its passage over Greenwich.

The magnitude of the atmosphere is very beautifully contrived, as is the adaptation of everything on the earth's surface to it; were this magnitude increased, the animal and vegetable kingdoms would require a different structure; and in hurricanes of ordinary occurrence, an increase of weight would cause all things to be destroyed by the additional force.

The mean annual temperature of the atmosphere would be the same on each parallel of latitude, decreasing from the equator towards the north and south poles, were it not that a different amount of terrestrial radiation is given out by the ocean, by mountains, table-land, plains, by deserts and cultivated land, by swamps and by dry soil; these operate to so great an extent as to cause a change of temperature in different localities under the same parallel of latitude.

To the thinking man, the wonderful properties of the atmosphere which are incessantly at work for the benefit of the world, cannot be otherwise than matter for wonder and admiration. Several years ago, one of the writers in the "Quarterly Journal" placed some beautiful ideas on record on this subject, from which it would be difficult to refrain enlarging upon, and in part copy, as they must prove interesting to all who admire nature and nature's laws. "Oxygen and carbonic acid are diffused all over the world; wherever man is, he will be inhaling the former and exhaling the latter. The carbonic acid which we are at the present moment exhaling with our breath, how speedily will it be carried miles away from us, passing to the north and to the south in its endeavours to traverse the world. The cedars of Lebanon, the stately auricarias of the Andes, and the beautiful and noble pine tribe of the Himalayas, will partake of it, to increase their size; the date trees of the valleys of the Nile, the gold and silver ferns of the West Indies, and the large Dicksonias of New Holland, will drink it in by their leaves and fronds; the cocoa-nuts of Tahati, the grapes of Portugal, and the mangoes of the Amboyna Islands, will ripen upon it; whilst the numerous ericas of the Cape, the gorgeous lilies of Japan, and the slender orchidaceous parasites of India, will transform it into flowers. The oxygen gas we are breathing from the atmosphere, has recently been distilled for our use by the huge magnolias of the Susquehana and the sweet-scented Stephanotos of

Madagascar. The large rhododendrons of the Himalaya, the filices of Madeira, and the diminutive lichens of Iceland, have contributed their mite to it. The grateful and refreshing rain we see descending so abundantly around us, was thawed from the mountainous icebergs of the polar seas; and aquatic vegetation has sucked up from the Nile, the Mississipi, and the Tigris, and exhaled as vapours, the mighty snow-fields of the Andes, the Atlas, and the Alps."

(To be continued.)

THE NATURAL HISTORY OF NOTTINGHAMSHIRE.

It is always interesting to be enabled at a glance to compare the Natural History of one portion of a country with that of another, in order to observe the richness or meagreness of different species. One locality will be rich in plants, another in fossils, a third in shells; others in fish, birds, insects, or reptiles; in short, whatever place is visited, there is sure to be some interest attached, to reward the investigation of the naturalist. The first paper upon this subject will be devoted to the Land and Fresh-water Mollusca now found in a living state near Nottingham.

Bivalves, (Fresh-water.)

Cycladidæ:—

Cyclas rivicola—River Cycle: abundant in the Trent and Soar.

Cyclas cornea—Horny Cycle: common.

Cyclas caliculata—Capped Cycle: very local; near Beeston, Highfield House, and in Clumber Lake.

Pisidium amnicum—Abundant in the Trent near Beeston, also a dyke near Highfield House.

Pisidium cinereum—Clumber Lake.

Pisidium Henslowianum—Appendaged Pera: very rare near Beeston.

Pisidium nitidum—Shining Pera: Clumber Lake.

Pisidium obtusale—Gibbous Pera: rare near Beeston.

Pisidium pulchellum—Beautiful Pera: rather rare near Beeston.

Pisidium pusillum—Common.

Mitilidæ:

Dreissena polimorpha—Zebra Dreissena: common in the lake at Highfield House; canal, Lenton; Trent; canal, Beeston; Soar, at Thrumpton; and lake at Wollaton.

Unionidæ:—

Unio tumidus—Tumid Unio: common in Trent, and Soar, and our canals.

Unio tumidus, *var.* ovalis—in the canal near Beeston.

Unio pictorum—Painter's Unio: Trent, Soar, our canals, and the lake at Highfield House: common.

Unio pictorum, *var.* rostrata—in the Trent.

Unio pictorum, *var.* Deshaysii—in the Trent.

Unio—a dubious species; in the Trent, which puzzled the late Professor Edward Forbes.

Anodonta cygnea—Swan Fresh-water Mussel: common.

Anodonta cygnea, *var.* anatina—common.

Anodonta cygnea, *var.* avonensis—Trent, near Beeston: rare.

Anodonta cygnea, *var.* contorta—lake at Highfield House: rare.

Anodonta cygnea, *var.* ventricosa—lake at Highfield House: rare.

UNIVALVES, (FRESH-WATER.)

Neritidæ:

Neritina fluviatilis—River Neritine: Trent, Soar, and our canals: abundant.

Paludinidæ:

Paludina vivipara—Common Marsh Shell: common.

Bithinia tentaculata—Tentacled Bithinia: common.

Bithinia Leachii—Dr. Leach's Bithinia: rather abundant, but very local.

Valvata piscinalis—Stream Valve Shell: common.

Valvata cristata—Crested Valve Shell: abundant at Bulwell, and less sparingly in several other localities.

LAND SHELLS.

Limacidæ:

Arion empiricorum—Common Arion: common.

Arion hortensis—Garden Arion: common.

Arion flavus—Yellow Arion: not uncommon at Highfield House, Wollaton, and Oxton.

Limax agrestis—Milky Slug: common.

Limax flavus—Yellow Slug: common in Nottingham.

Limax arborum—Tree Slug: abundant at Highfield House.

Limax cinereus—Spotted Slug: rather abundant.

Limax Brunius, *var.* pygmæus—Brown Slug: rare at Highfield House.

Helicidæ:

Vitrina pellucida—Transparent Glass Bubble Shell: tolerably abundant.

Zonites cellarius—Cellar Snail: common.

Zonites alliarius—Garlic Snail: not uncommon at Highfield House, Thrumpton, and Sawley.

Zonites nitidulus—Dull Snail: rather abundant.

Zonites purus—Delicate Snail: rare at Highfield Hause, Oxton, Stanton, and Bulwell.

Zonites radiatulus—Rayed Snail: common.

Zonites excavatus—Excavated Snail: a single specimen found at Sawley.

Zonites nitidus—Shining Snail: common.

Zonites crystallinus—Crystalline Snail: sparingly in many localities.

Helix aspersa—Common Snail: local, but very abundant.

Helix revelata—Green Snail: rare at Stanton.

Helix nemoralis—Girdled Snail: common.

Helix arbustorum—Shrub Snail: not uncommon, at Thrumpton and Sawley.

Helix virgata—Zoned Snail: a single specimen found at Highfield House. This may possibly have been introduced with stone.

Helix caperata—Black-tipped Snail: very common at Stanton.

Helix ericetorum—Heath Snail: abundant at Stanton.

Helix hispida—Bristly Snail: common.

Helix hispida, *var.* concinna—common.

Helix hispida, *var.* depilata—common.

Helix hispida, *var.* sericea—common.

Helix sericea: rare at Oxton and Bulwell.

Helix aculeata—Prickly Snail: abundant at Highfield House, rare at Stanton.

Helix fulva—Top-shaped Snail: not abundant.

Helix pulchella—White Snail: not uncommon.

Helix rotundata—Radiated Snail: common.

Helix pygmæa—Pygmy Snail: rare at Highfield House and Stanton.

Bulimus obscurus—Dusky Twist Shell: common at Highfield House and Nottingham Castle.

Pupa umbilicata—Umbilicated Chrysalis Shell: common.

Pupa pygmæa—Pygmy Chrysalis Shell: rare at Highfield House.

Pupa substriata—Six-toothed Chrysalis Shell: a single specimen at Highfield House.

Balea fragilis—Fragile Moss Shell: rare.

Clausilia nigricans—Dark Close Shell: common, but local.

Zua lubrica—Common Varnished Shell: common.

Azeca tridens—Glossy Trident Shell: very rare at Highfield House.

Achatina acicula—Needle Agate Shell: Ratcliffe.

Mud Shells.

Succinea putris—Common Amber Shell: rather abundant.

Succinea gracilis—Slender Amber Shell: common.

Water Shells.

Lymnæade:

Physa fontinalis—Stream Bubble Shell: abundant.

Physa hypnorum—Slender Bubble Shell: common, but local.

Planorbis corneus—Horny Coil Shell: abundant.

Planorbis albus—White Coil Shell: abundant.

Planorbis nautileus—Nautilus Coil Shell: rather abundant at Highfield House and Stanton.

Planorbis marginatus—Margined Coil Shell: common.

Planorbis carinatus—Carinated Coil Shell: common.

Planorbis vortex—Whorl Coil Shell: common.

Planorbis spirorbis—Rolled Coil Shell: sparingly.

Planorbis contortus—Twisted Coil Shell: Radford, Bulwell, and Lenton, not common.

Planorbis nitidus—Fountain Coil Shell: Highfield House and Radford, not common.

Limnæus auricularius—Wide-mouthed Mud Shell: common.

Limnæus auricularius, *var.* acuta—Lake, Highfield House.

Limnæus pereger—Puddle Mud Shell: common.

Limnæus stagnalis—Lake Mud Shell: common.

Limnæus truncatulus—Ditch Mud Shell: common.

Limnæus glaber—Eight-whorled Mud Shell: one specimen at Bulwell.

Limnæus palustris—Ditch Mud Shell: abundant.

Limnæus glutinosus—Glutinous Mud Shell: near Beeston, rare.

Ancylus fluviatilis—Common River Limpit: common.

Ancylus oblongus—Oblong Lake Limpit: local, but rather plentiful.

LAND SHELLS.

Auriculidæ:

Carychium minimum—Minute Sedge Shell: common.

The nomenclature of the above, is that adopted by the late Professor Edward Forbes, in his work on the British Mollusca.

(To be continued.)

OBSERVATIONS ON THE PLANET EUPHROSYNE, AT THE HAMBURGH OBSERVATORY.

By M. C. Rümker, and M. G. Rümker.

M. Rümker, director of the Hamburgh Observatory, and his son M. G. Rümker, his assistant, (late of the Durham Observatory,) have forwarded the following observations to Dr. Lee, of Hartwell, who has kindly permitted me to make them public.

POSITIONS OF THE PLANET.

1855.	Hamburgh M. T.	Apt. R. A.	Decl.	Number of Observations.
Sept. 6th.	15h. 18m. 39·5s.	8h. 15m. 20·310s.	+ 40° 21′	3.
" 18th.	14h. 28m. 15·3s.	8h. 43m. 3·043s.	+ 40° 12′ 59·3″	10.

M. Rümker remarks that the Planet may have been but little observed in England, where the astronomers may perhaps not have been attentive to its return this year, or have been of opinion that it would be too faint, but, notwithstanding that it is faint, it may be observed. A very correct Ephemeris of this Planet by Mr. Winnecke, is published in No. 979 of the "Astron. Nachrichten." M. Rümker has already published a supplement to his splendid catalogue of fixed stars, and his son, M. G. Rümker, a work on the comet discovered by Schweizer, in 1853.

CURIOUS SPRINGS AND WELLS.

The Artesian well, at Tours, on the Loire, threw up land and fresh-water shells and bog plants, on the 30th. of June, 1831. The warm Artesian well of Cannstadt contains salt and carbonic acid. The salt-spring at the baths of Nauheim, in the Wetterau, has a temperature of 86° F. The sulphur spring at Langenbrücken, has a temperature of 56°. At Artern, from the depth of 1000 feet, a spring rises containing 27.4 per cent of salt at a temperature of 65.3°. The salt-spring of Neusalzwerk, in 1843, yielded 440,000 gallons daily, that is, 145,800 pounds of salt, at a temperature of 91°. The well of Grenelle, at Paris, is 1686 feet deep, and throws up 744,490 gallons daily. A well at Bruck, near Erlangen, having had a leathern hose of two inches in diameter fixed on to it, threw the water 70 feet high.

The following are the temperatures of various springs:—at Ems, 133°; Wiesbaden, 158°; Burtscheid, 171½°, (temperature of the place 50°;) Trincheras, near Puerto Cabello, 206½°, (temperature of the place 8½°;) Enontekis, in Lapland, 34°, (temperature of the place 26°;) Plombieres, in Lorraine, 149°, the water as pure as rain; at Gastein, 117½°, water pure; Wildbad, Würtemburg, 99½°, water pure; Budenweiler, 81½°; Warmbrunn, in Silesia, 97°; Peters, in the Caucasus, 194°; Pisa, 111°, pure water, except a small amount of sulphate of lime in solution; Lucca, 123°; Leuk, 93°.

(To be continued.)

CALENDAR OF NATURE FOR SEPTEMBER, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

BY THE EDITOR.

September 1st.—Potatoe disease shewing itself; also the mildew upon the vines.

12th.—Orlean Plums ripe.

13th.—Jargonelle Pears ripe. In 1852, ripe on the 1st.

15th.—Wheat Plum ripe; American Summering Apple ripe.

16th.—Peaches ripe. They were ripe in 1852, August 26th.; 1851, September 4th.; 1850, September 5th.; 1848, August 29th.; 1847, August 24th. Mean time August 30th., range twelve days. In 1855 they were seventeen days later than usual, and eleven days later than before recorded.

17th.—Nectarines ripe. Second crops of clover now gathered, many very good crops, and got in without rain. More wasps, yet not abundant.

19th.—Green-gage Plums ripe. Noticed several Partridges with diseased bills.

29th.—A vast cloud of small flies (Aphis Brassicæ,) appeared this morning at 9h. 30m. a.m.; everything covered with them; they had been rather numerous for some days previous. The same vast numbers were noticed in many parts of Nottinghamshire, Leicestershire, Gloucestershire, Derbyshire, Cheshire, Lancashire, and Cumberland; at Edinburgh, and at Aberdeen.

ON THE PRESENT CONDITION OF THE CRAIG TELESCOPE AT WANDSWORTH.

(A paper read by Dr. Lee, F.R.S., at the British Association, September, 1855.)

THE monster telescope erected by the Rev. Mr. Craig, on Wandsworth Common, has lately been improved by the addition of proper stops in the tube, which cut off *false light*. This addition, (suggested by the Rev. J. B. Reade, of Stone, near Aylesbury,) prevents the necessity of stopping out the centre of the object-glass. It is hoped that when the new crown-lens is ready for use, and properly adjusted, the vision will be much better: this lens will be machine-polished. A very simple apparatus has been successfully added to the camera, which secures perfect *equatorial motion* for about a minute; which is *double* the time required for photographic pictures of the moon. A photographic lens will be added to the telescope, similar to the one now under preparation by Ross, for the Solar photographic telescope, at Kew. Such a lens, though necessary for the small telescope at Kew, (which would not give an image of the sun of more than an inch in diameter at the focus,) is less important at Wandsworth, where the object-glass alone gives an image of the sun of more than eight inches in diameter, and consequently gives the peculiarity of the *mottled-surface* by the initial magnifying power.

STATE OF THE WEATHER IN SEPTEMBER, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY.

FINE, (except 2nd., overcast and windy. 12th., 8h. 30m. light shower. 13th., rain. 17th., 8 a.m. light shower, and after 10 p.m. rain. 23rd., 9h. 40m. p.m. rain. 28th., fair, 11 a.m. shower, 8h. 20m. p.m. rain. 29th., 10 a.m. thunder, 5h. 40m. p.m. heavy shower. 30th., 2h. 30m. p.m. shower, dull afterwards.)

Result of observations made at Highfield House, in September, 1855:—

Mean height of barometer, corrected and reduced to 32° F., (altitude of cistern above sea level being 181 feet,) 29.970 inches.

Mean pressure of dry air, or that of the gases, 29.582 inches.

Elastic force of vapour, or mean pressure of the water contained in the air, 0.388 of an inch.

Excess or defect of the barometer in September, 1855, from the mean of the last eight years, + 0.083 of an inch.

Mean pressure of September from 1847 to 1854, 29.887 inches.

Greatest height of the barometer, (reduced,) 30.402 inches, (on the 24th.)

Least height of the barometer, (reduced,) 29.247 inches, (on the 28th.)

Range of the barometer, 1.155 inches.

Mean temperature of the dry-bulb thermometer, (corrected for diurnal range,) 56.6°.

Mean temperature of the greatest heat and greatest cold of each day, (corrected for diurnal range,) 55.9°.

Adopted mean temperature, 56.2°.

Mean temperature of September from 1809 to 1852, 56.6°.

Mean temperature of September from 1847 to 1854, 54.6°.

Mean temperature of September from 1810 to 1820, 57.9°.

Mean temperature of September from 1820 to 1830, 57.6°.

Mean temperature of September from 1830 to 1840, 55.4°.

Mean temperature of September from 1840 to 1850, 55.9°.

Excess or defect of September, 1855, from the mean of the last eight years, + 1.6°.

Excess or defect of September, 1855, from the mean of the last forty years, — 0.4°.

Greatest cold of the night, 33.5°, (on the 27th.)

Greatest heat of the day, 74.9°, (on the 22nd.)

Diurnal range of temperature, 41.4°.

Minimum temperature on grass, 27.5°, (on the 27th.)

Maximum temperature in sunshine, 112.0°, (on the 11th.)

Range of temperature between the greatest cold on the grass and the greatest heat in the sunshine, 84.5°.

Greatest amount of solar radiation, 38.0°, which occurred on the 11th.

Greatest amount of terrestrial radiation, 6.2°, which occurred on the 13th.

Mean temperature of the wet-bulb thermometer, (corrected for diurnal range,) 53.3°.

Mean temperature of evaporation, 53.3°.

Mean temperature of the dew point, 51.1°.

Mean temperature of the dew point between 1847 and 1854, for September, 49.4°.

Excess or defect of the mean dew point in September 1855, + 1.7°.

Mean amount of ozone, 3.3.

Mean amount of ozone in the night, 3.6.

Mean amount of ozone in the day, 3.1.

Number of nights without ozone, 2.

Number of days without ozone, 11.

Mean amount of ozone with a west wind, 1.7.

Mean amount of ozone with a north-west wind, 1.6.

Mean amount of ozone with a north wind, 7.4.

Mean amount of ozone with a north-east wind, 5.0.

Mean amount of ozone with an east wind, 1.7.

Mean amount of ozone with a south-east wind, 3.3.

Mean amount of ozone with a south-west wind, 1.7.

Amount of rain fallen twenty-five feet from the ground, 0.550 of an inch.

Amount of rain fallen two feet from the ground, 0.6 of an inch.

Average amount of rain in September for the past eleven years, 2.5 inches.

Excess or defect in September, 1855, of the average fall of rain, – 1.9 inches.

Number of days on which rain fell, 6.

Amount of evaporation, 3.349 inches.

Average amount of evaporation in September, between 1848 and 1854, 3.6 inches.

Excess or defect in the amount of evaporation from the mean in 1855, – 0.3 of an inch.

Mean daily amount of evaporation, 0.112 of an inch.

Greatest amount of evaporation in twenty-four hours, 0.210 of an inch.

Least amount of evaporation in twenty-four hours, 0.044 of an inch.

Mean amount of cloud at 9 a.m., 6.3.

Mean amount of cloud at 10 p.m., 5.0.

Mean daily amount of cloud, 5.7.

Number of days overcast at 9 a.m., 8.

Number of days overcast at 10 p.m., 11.

Number of days cloudless at 9 a.m., 3.

Number of days cloudless at 10 p.m., 3.

Mean weight of vapour in a cubic foot of air, 4.4 grains.

Average mean weight of vapour in a cubic foot of air, between 1848 and 1854, 4.2 grains.

Excess or defect in 1854, + 0.2 of a grain.

Additional weight of vapour required to saturate a cubic foot of air, 0.9 of a grain.

Average additional weight of vapour required to saturate a cubic foot of air between 1848 and 1854, 0.9 of a grain.

Excess or defect in 1855, ± 0 of a grain.

Degree of humidity, (complete saturation being 1.000,) 0.831.

Mean degree of humidity for September, from 1848 to 1854, 0.823.

Excess or defect in 1855, – 0.008.

Mean weight of a cubic foot of air, 532.5 grains.

Excess or defect of the mean weight of a cubic foot of air in September, 1855, – 0.5 of a grain; the average of September between 1848 and 1854 being 533 grains.

Whole amount of water in a vertical column of the atmosphere, 5.37 inches.

Average whole amount of water in a vertical column of the atmosphere for the last four years, 5.0 inches; excess or defect in September, 1855, + 0.4 of an inch.

(+ is in excess of the mean, and – in defect of the mean.)

AMOUNT OF RAIN FALLEN AT HIGHFIELD HOUSE, IN SEPTEMBER, DURING THE PAST TWELVE YEARS.

1844,	2.7 inches,	1850,	2.0 inches,
1845,	1.5 "	1851,	1.5 "
1846,	1.3 "	1852,	5.3 "
1847,	2.2 "	1853,	2.1 "
1848,	3.5 "	1854,	0.9 "
1849,	5.0 "	1855,	0.5 "

FALL OF RAIN IN AUGUST, 1855.

	Inches.
Bolton.—H. H. Watson, Esq.	3.77
Arbroath.—A. Brown, Esq.	3.73
St. Paul's Parsonage, near Wigton, Cumberland.—Rev. F. Redford.	3.1
Alderley Edge, Cheshire.—J. W. Long, Esq.	2.75
Isle of Man.—W. Burman, Esq.	2.71
Lampeter.—J. Mathews, Esq.	2.62
Berkhampstead.	2.13
Leeds.—H. Denny, Esq.	1.89
Wakefield—W. Milner, Esq.	1.89
Laurel Bank, Elgin.—W. Geddes, Esq.	1.88
Rose Hill, near Oxford.—Rev. J. Slatter.	1.87
Worcester Observatory.—N. Edis, Esq.	1.86
Newport, Isle of Wight.—J. C. Bloxam, Esq.	1.73
Royston, Hertfordshire.—Hale Wortham, Esq.	1.63
Grantham Observatory.—J. W. Jeans, Esq.	1.42
Beeston Observatory.	1.16
Highfield House Observatory.	1.10
Exeter.—C. H. Roper, Esq.	1.08
Uckfield.—C. L. Prince, Esq.	0.67

FALL OF RAIN IN SEPTEMBER, 1855.

	Inches.
Boston.—T. Collis, Esq.	0.35
Wakefield—W. Milner, Esq.	0.37
Grantham.—J. W. Jeans, Esq.	0.35
Arbroath, N. B.—A. Brown, Esq.	0.45
Leeds.—H. Denny, Esq.	0.47
Observatory, Beeston.	0.52
Observatory, Highfield House.	0.56
Isle of Man.—W. Burman, Esq.	0.79
Norwich.—W. Brooke, Esq.	0.84
Uckfield.—C. L. Prince, Esq.	0.88
Manchester.—G. V. Vernon, Esq.	0.96
Lampeter, Cardiganshire.—Rev. J. Mathews.	1.05
Alderley Edge, Cheshire.—J. W. Long, Esq.	1.26
Royston, Hertfordshire.—H. Wortham, Esq.	1.26
Bolton.—H. H. Watson, Esq.	1.28
Berkhampstead.	1.66
Rose Hill, Oxford.—Rev. J. Slatter.	2.53
Newport, Isle of Wight.—J. C. Bloxam, Esq.	3.02

DIRECTION OF THE WIND, AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN SEPTEMBER, 1855.

In order to make this report shorter, and yet contain the same information, an alteration has been made in the manner of entering the changes; the direction is given for 12 a.m. every day, and again as often as any change takes place.

1st.—NW, 2h. 15m. a.m. NNW, 6h. 15m. a.m. W, 6h. 45m. a.m. N, 9h. 30m. a.m. NE, 7h. 30m. p.m. NNE, 8h. 45m. a.m. N.

2nd.—N, 8h. 15m. a.m. NE, 12h. 15m. p.m. ENE, 6h. 30m. p.m. NE, 9h. 30m. NNE.

3rd.—NNE, 7 a.m. NE, 10 a.m. ENE, 3 p.m. E, 4h. 15m. p.m. ENE, 8h. 15m. p.m. NE, 8h. 45m. NNE, 9h. 15m. N.

4th.—N, 2 a.m. NNE, 5h. 30m. a.m. NE, 6h. 45m. a.m. NNE, 7 a.m. NE, 7h. 15m. a.m. ENE, 8 a.m. NE, 9h. 45m. a.m. ENE, 10 a.m. NE, 11h. 45m. a.m. ENE, 12h. 45m. p.m. NE, 1h. 30m. p.m. ENE, 2 p.m. NE, 2h. 30m. p.m. ENE, 3h. 15m. E, 3h. 30m. ENE, 4h. 15m. NNE, 4h. 45m. NE, 8h. 15m. ENE, 9h. 15m. NE, 10h. 15m. NNE.

5th.—N, 3 a.m. NNE, 3h. 15m. NW, 5h. 30m. WNW, 5h. 45m. NNE, 6h. NW, 6h. 15m. NNE, 7h. 45m. NE, 7 p.m. NNE, 9h. 15m. N.

6th.—NNE, 12h. 45m. a.m. N, 3h. 30m. NNE, 3h. 45m. NW, 4h. NNE, 4h. 15m. N, 4h. 30m. NNE, 4h. 45m. N, 5h. 30m. NW, 5h. 45m. NNW, 6h. N, 10h. 30m. NNE, 9h. 30m. p.m. N, 9h. 45m. NNE, 11h. N, 11h. 15m. NNE.

7th.—N and NNE, 1 a.m. NNW, 1h. 30m. E, 2h. NE, 2h. 15m. N, 2h. 45m. NW, 4h. E, 4h. 15m. ENE, 4h. 45m. NE and NNE, 6h. 30m. E, 6h. 45m. SE, 7h. 45m. ESE, 8h. E, 11h. 15m. SE, 11h. 30m. S, 11h. 45m. SW, 12 p.m. SE, 12h. 15m. SW, 12h. 30m. E, 12h. 45m. SW, 1h. W, 1h. 15m. SW, 1h. 30m. WSW, 1h. 45m. SW, 2h. SSW, 2h. 15m. S, 2h. 30m. SE, 2h. 45m. ESE, 3h. 15m. S, 3h. 30m. SSW and SW, 5h. 15m. S, 5h. 30m. SE, 5h. 45m. S, 6h. SW, 7h. 15m. W, 11h. WSW.

8th.—WSW, 1 a.m. W, 1h. 15m. WNW, 5h. W, 8h. WSW, 10h. 30m. W, 12 p.m. WSW, 2h. W.

9th.—WSW, 2 a.m. W, 9h. WNW, 12h. 30m. p.m. N, 12h. 45m. NNE, 1h. WNW, 1h. 15m. NE, 1h. 30m. NW, 3h. 30m. N, 3h. 45m. NW, 6 p.m. WNW.

10th.—WNW, 9 a.m. N, 9h. 15m. NNE, 10h. NE, 1 p.m. E, 2h. 15m. ESE, 4h. 30m. SE, 8h. 30m. S, 8h. 45m. W, 9h. 30m. N, 9h. 45m. ENE, 10h. E, 10h. 30m. N, 10h. 45m. NW.

11th.—NW, 12h. 45m. a.m. WNW, 2h. 30m. W, 12h. 15m. p.m. WNW, 11h. SW, 11h. 15m. SSW, 11h. 30m. WSW.

12th.—W and WNW, 2h. 15m. a.m. SW, 2h. 30m. W, 3h. 30m. SW, 3h. 45m. WSW, 6h. W, 12h. 45m. p.m. SW, 1h. W, 7h. WSW.

13th.—WSW, 5h. 30m. a.m. S, 5h. 45m. SE, 6h. ESE, 6h. 45m. E, 8h. 15m. ENE, 8h. 30m. NE.

14th.—NE, 5h. 45m. a.m. N and NNE, 7h. 30m. NE, 8h. 45m. N and NNE, 10h. NE, 11h. N, 11h. 15m. NE and NNE, 12h. 15m. p.m. N, 2h. 45m. ENE, 1h. 30m. NNE, 4h. 45m. NE, 6h. 45m. NNE, 10h. NE, 10h. 15m. ENE.

15th.—ENE, 8h. 30m. a.m. E, 8h. 45m. ESE, 9h. 45m. SE, 10h. SSE, 10h. 15m.

S, 11h. SSW, 12h. 30m. p.m. SW, 1h. WSW, 1h. 15m. W, 3h. 45m. WSW, 7h. 45m. W, 9h. WSW, 10h. 45m. SW.

16th.—SW, 3h. 45m. a.m WSW, 5h. 30m. SW, 6h. 30m. WSW, 7h. 45m. W, 3 p.m. WNW.

17th.—W, 10h. 45m. a.m. SW, 11h. SSW, 11h. 15m. S, 11h. 45m. WSW, 12h. 15m. p.m. SSW, 1h. 15m. SW, 2h. 15m. SSW, 7h. 30m. S, 7h. 45m. SE, 8h. ESE, 8h. 30m. SSE, 8h. 45m. S, 9h. 30m. SE.

18th.—SE, 3h. 30m. a.m. ESE, 4h. 30m. E, 10h. 30m. SE, 10h. 45m. S, 11h. SW, 3h. 15m. p.m. W, 4h. SW, 7h. SSW, 7h. 30m. W, 7h. 45m. WNW, 8h. NW, 11h. N, 11h. 15m. NE.

19th.—NE, 11h. 15m. a.m. E, 11h. 30m. SE, 11h. 45m. SSE, 12 p.m. S, 12h. 30m. SSW, 12h. 45m, SW and SSW, 2h. WSW, 2h. 15m. W, 2h. 30m. WNW, 3h. 15m. NW.

20th.—WSW, 9h. 15m. a.m. SW, 10h. 30m. W, 2h. 30m. p.m. WSW, 3h. 45m. SW, 7h. WSW, 7h. 15m. W, 7h. 30m. WSW.

21st.—WSW, 1h. 30m. a.m. SW, 9h. 15m. W, 7h. 45m. p.m. WNW, 9h. NW.

22nd.—NW, 8h. 30m. a.m. W, 9h. SSW, 10h. 15m. S, 11h. 45m. SW and WSW, 12h. 15m. p.m. S, 1h. 30m. SSE, 9h. 30m. E.

23rd.—NNW, 7 a.m. N, 8h. 15m. NE, 11h. NNE, 11h. 45m. ENE, 1 p.m. E, 2h. ENE, 4h. NE, 5h. 15m. NNE, 6h. 45m. NE.

24th.—NE, 10h. 15m. a.m. ENE, 10h. 15m. p.m. NE, 11h. 30m. NNE, 11h. 45m. N.

25th.—N, 2h. 30m. a.m. NNE, 8h. 30m. NE, 8h. 45m. ENE, 9h. E, 9h. 15m. ESE, 9h. 45m. SE, 12h. 15m. p.m. E, 12h. 45m. SE, 4h. 45m. E.

26th.—E, 2h. 30m. a.m. N, 8h. 15m. ENE, 8h. 45m. E, 9h. 15m. S, 9h. 30m. SSW, 10h. SSE, 7h. 15m. p.m. SE.

27th.—SE, 12h. 15m. a.m. moved through E and N to NNW, 9h. 30m. N, 9h. 45m. ESE, 10h. 15m. SE, 11h. 45m. SSE, 12h. 15m. p.m. S, 12h. 45m. SSW, 4h. 30m. S, 4h. 45m. SSE, 6h. 30m. S.

28th.—S, 12h. 15m. a.m. SW, 4h. S, 11 p.m. SSW, 11h. 30m. W, 11h. 45m. E.

29th.—W, 5h. 30m. a.m. SE, 5h. 45m. E, 6h. 15m. ENE, 6h. 45m. NW, 7h. NNW, 9h. 45m. NE, 10h. E, 10h. 15m. ESE, 10h. 30m. SE, 10h. 45m. E, 11h. SE, 3h. 30m. p.m. ESE, 4h. E.

30th.—E, 3h. 30m. a.m. NE, 4h. ENE, 5h. E, 5h. 30m. ENE, 7h. 45m. NNE, 11h. E, 6h. 15m. p.m. ENE.

FORCE OF THE WIND, AS WRITTEN BY THE ATMOSPHERIC RECORDER, AT THE BEESTON OBSERVATORY, IN SEPTEMBER, 1855.

1st.—Calm, 6 a.m. 3 to 5 oz., 8h. 15m. calm, 9h. 45m. 11 oz., 10h. 1 lb. 4 oz., 10h. 15m., 4 oz., 10h. 45m. 1 lb. 11 oz., 11h. 4 oz. to 9 oz., 12h. 15m. p.m. 1 to 4 oz., 2h. 7 oz., 2h. 15m. 1 lb. 4 oz., then 8 oz. to 1 lb. 4 oz., 5h. 45m. calm, 9h. 45m. 1 to 5 oz., 10h. 45m. calm.

2nd.—1 to 4 oz., 7h. 15m. a.m. 1 lb. 7 oz., 7h. 30m. 1 lb., 8h. 15m. 1 lb. 10 oz., 8h. 30m. 4 oz., 9h. 45m. 9 oz. to 1 lb. 11 oz., 12h. 15m. p.m. 1 to 4 oz., 2h. 7 oz. to 1 lb. 4 oz., 5h. 15m. 5 oz., 5h. 45m. calm, 9h. 45m. 1 to 5 oz., 10h. 45m. calm.

3rd.—Under 4 oz , 8 a.m. 7 oz., 8h. 30m. 1 lb. 6 oz., 9h. 4 to 11 oz., 1h. 15m. p.m. 1 lb. 6 oz. to 1 lb. 10 oz., 2h. 8 oz. to 1 lb. 6 oz., 5h. 4 oz., 8h. calm to 3 oz.

4th.—4 oz. till 10 a.m., 4 to 8 oz. till 11h. 30m., 1 to 4 oz. till 7 p.m., then calm.

5th.—Calm. 5h. 30m. a.m. 1 to 4 oz., 8h. 30m. 7 oz. to 1 lb. 11 oz., 5 p.m. 4 to 7 oz., 8h. calm.

6th.—1 to 4 oz., 8h. 15m. a.m. 6 oz. to 1 lb. 7 oz., 4h. 30m. p.m. 1 to 5 oz., 7h. 45m. calm.

7th.—Calm.

8th.—Calm, 9 a.m. 1 to 3 oz., 7 p.m. calm.

9th.—Calm, 4 a.m. 1 to 3 oz., 6h. 15m. calm, 9h. 45m. 1 to 3 oz., 12h. 15m. p.m. calm, 3h. 30m. 1 to 7 oz., 5h. 45m. calm.

10th.—Calm.

11th.—Calm, 12h. 15m. p.m. 1 to 4 oz., 3h. 30m. 1 lb. 5 oz., 3h. 45m. 4 to 5 oz., 5h. 45m. 1 oz., 7h. calm.

12th.—Calm, 10h. 15m. a.m. 2 to 4 oz.

13th.—Calm, 2 p.m. 4 oz. to 1 lb. 5 oz., 5h. 15m. 4 oz., 8h. 45m. 10 oz. to 1 lb. 6 oz, 11h. 30m. 4 oz.

14th.—1 to 4 oz., 2 a.m. calm, 3h. 30m. 1 to 4 oz., 6h. calm.

15th.—Calm.

16th.—Calm, 3h. 45m. a.m. 1 to 2 oz., 8h. 1 lb. 3 oz., 9h. 1 lb. 7 oz., 9h. 30m. 8 to 12 oz., 10h. 45m. 4 oz., 12h. 45m. p.m. 1 lb. 4 oz., 1h. 4 oz., 2h. 1 lb., 2h. 15m. 4 oz., 5h. 30m. 1 oz., 9h. 45m. calm.

17th.—Calm.

18th.—Calm.

19th.—Calm.

20th.—Calm, 8h. 30m. a.m. 1 to 4 oz., 11h. 15m. 5 to 11 oz., 2h. 15m. p.m. 2 oz., 5h. 45m. 1 oz.

21st.—Calm, 9h. 30m. 4 oz., noon 3 oz., 3 p.m. 2 oz., 4h. 1 oz, 8h. 15m. calm.

22nd.—Calm.

23rd.—Calm, 5h. 15m. p.m. 1 lb. 7 oz., 5h. 30m. 8 oz. to 1 lb. 9 oz., 6h. 45m. 4 oz., 8h. 1 lb. 8 oz., 8h. 15m. 4 oz., 10h. 15m. 1 lb. 6 oz., 10h. 45m. 4 to 6 oz.

24th.—4 oz., 1 a.m. 1 lb. 5 oz., 2h. 4 oz., 3h. 1 lb. 5 oz., 3h. 15m. 4 oz., 5h. 30m. 1 lb. 7 oz., 6h. 4 oz., 9h. 1 lb. 7 oz., 10h. 4 to 9 oz., 11h. 1 lb. 3 oz., 3 p.m. 4 oz. to 1 lb. 3 oz., 5h. 15m. 2 to 4 oz.

25th.—Calm, 11h. 30m. a.m. 4 oz., 6 p.m. 1 oz.

26th.—1 oz., 8h. 30m. a.m. 1 oz., 10h. 30m. 4 oz., 2h. 30m. p.m. 1 to 2 oz., 8h. 30m. calm.

27th.—Calm, noon 1 to 3 oz.

28th.—1 to 4 oz., 9 a.m. 1 lb. 4 oz., 1h. 30m. p.m. 1 lb. 10 oz., 2h. 30m. 1 lb. 5 oz., 5h. 30m. 4 oz., 9h. 45m. 1 oz.

29th.—1 oz. 12h. 45m. p.m. 2 oz., 6h. 30m. 3 oz.

30th.—3 oz.—10h. 15m. a.m. 4 oz., noon 1 lb. 5 oz. to 1 lb. 14 oz., 2 p.m. 7 oz. to 1 lb. 9 oz., 3h. 15m. 5 oz.

The entry of the Force of Wind is shortened in a similar manner to that adopted with the Direction.

ELECTRICITY AT THE BEESTON OBSERVATORY, DURING SEPTEMBER, 1855.

During the month the Electricity was positive, and feeble in amount, except on the 7th., when more powerful early, and negative at 10 a.m., and on the 12th., when not quite so feeble. On the 29th., thunder was twice heard at 10 a.m., in WSW direction.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

This valuable Society has just completed its twenty-fifth annual meeting. The proceedings commenced on the 12th. of September at Glasgow, under the Presidency of His Grace the Duke of Argyll, F.R.S., when many important papers were read; amongst which may be mentioned the following:—

Section A. Mathematical and Physical Science.

Rev. Professor B. Powell, F.R.S., on Luminous Meteors.

Sir Daniel Brewster, F.R.S., on the Radiant Spectrum, etc.

J. P. Joule, Esq., F.R.S., on the Force of Electro Magnets.

Professor W. Thompson, F.R.S., several papers on Electricity and Magnetism.

W. Whitehouse, Esq., on Velocity of Transmission of the Electric Telegraph.

Professor P. Smyth, F.R.S.E., on Solar Refraction.

Professor Nichol, on the Chronology of the Formations of the Moon.

Professor Stokes, F.R.S., on the Achromatism of a Double Object Glass.

Dr. Adamson, on the Fixing of Photographs.

A. Claudet, Esq., F.R.S., on the Polystereopticon, (a new instrument for exhibiting stereoscopic pictures.)

Captain W. S. Jacob, on Anomalies of the binary star 70 Ophiuchi.

Admiral Sir John Ross, on Aurora Borealis.

G. Buist, L.L.D., on Hailstorms in India.

J. A. Broun, Esq., F.R.S., on the establishment of a Magnetic and Meteorological Observatory on the mountain Angusteer Mullay, (6200 feet above the sea,) in Travancore.

M. J. Johnson, Esq., M.A., on Atmospheric Electricity.

R. Russell, Esq., on the Meteorology of the United States and Canada.

Captain Fitzroy, R.N., on Wind Charts.

Dr. Nichol, on the Weather in the West of Scotland.

Rev. Professor T. Chevallier, B.D., on a Rainbow seen after sunset, and on the Analogies between Heat and Lightning.

Rev. Dr. Scoresby, on Magnetic Phenomena.

Dr. Lee, F.R.S., on Snow Crystals and on Photographs.

Dr. Taylor, on the Nature and Cause of Water-spouts.

M. M. Negretti and Zambra, on a New Maximum Thermometer.

M. O. T. Mossotti, on the Calculation of an observed Eclipse, or Occultation of a star.

E. J. Lowe, Esq., F.R.A.S., on the Registration of Wind Force.

P. L. Simmonds, Esq., on Rain, Earthquakes, and Hail.

SECTION B. CHEMICAL SCIENCE.

Dr. Daubeny, F.R.S., on The late Eruption of Vesuvius.

M. Peligot, on the Composition of Air dissolved in Water.

J. B. Lawes, Esq., F.R.S., on Agricultural Chemistry.

Dr. Gladstone, F.R.S., Influence of Solar Radiation on growth of Plants under different Atmospheric conditions.

Sir E. Belcher, on Arctic Dietaries.

Dr. R. D. Thompson, on the Condition of the Atmosphere during Cholera.

Chevalier de Claussen, on the Preservation of the Potatoe Crop.

Professor Anderson, F.R.S., on a New Wax from India.

Baron Liebig, F.R.S., on a new form of Cyonic Acid.

J. Galletley, Esq., on a new Glucocide contained in the petals of the Wallflower.

SECTION C. GEOLOGY.

Mr. Hugh Miller, on Fossil Floras of Scotland.

Professor Harkness, on Lowest Sedimentary Rocks of Scotland.

Mr. J. Bryce, the Glacial Phenomena of the Lake district of England.

Sir R. J. Murchison, F.R.S., on a new Geological Map of Europe, and other papers.

Captain Sir E. Belcher, R.N., Discovery of Ichthyosaurus and other Fossils in the Northern Expedition.

Robert Mallet, Esq., on Earthquakes.

SECTION D. ZÖOLOGY AND BOTANY.

Professor Kölliker, on some rare Fishes.

Professor Daubeny, F.R.S., on the Action of Light upon the Germination of Seeds.

Professor Balfour, on the Distribution of plants in Britain, and the Alpine Flora of Scotland.

Dr. Lankester, F.R.S., on Portuguese Ferns.

Dr. Michelsen, on the Flowers and Vegetation of the Crimea.

N. B. Ward, Esq., F.R.S., on Vivaria.

Dr. Ransom, on the Structure of the Ova of Fishes and other Vertebrate animals.

Dr. Dickie, on the effects of last winter upon Vegetation at Aberdeen.

E. J. Lowe, Esq., F.R.A.S., on a Singular mortality among the Swallow tribe.

Dr. Barth, Description of Timbuctu.

In the other sections, papers were read by W. Fairbairne, Esq., F.R.S.; W. J. M. Rankine, Esq., F.R.S.; Professor Retzius; Sir B. F. Outram, F.R.S.; Col. Sykes, F.R.S.; G. Rennie, Esq., F.R.S.; Lieut.-Gen. Sir C. W. Pasley, F.R.S.; Capt. M' Clure, R.N.; etc.

The above are only a few of the many interesting papers read at this meeting, the more interesting of which will be described in future numbers.

BRITISH METEOROLOGICAL SOCIETY.

It is somewhat late in the day to refer to the Annual Report of the Council of this Society, as in a short time another report will be presented to the members; however, as it is full of interest, and as the magazine purposes to describe the proceedings of all the Learned Societies, it has been deemed desirable to quote the principal items of interest.

The Society is progressing satisfactorily. Meteorological Observations from upwards of sixty stations are recorded with standard instruments, and are published quarterly by the Registrar General of Births, Deaths, and Marriages, and also by the Society. During the year, three hundred thermometers have been examined by Mr. Glaisher; they were manufactured by Negretti and Zambra, and their great excellence is in part owing to the employment of tubes several years old. New thermometer tubes are not to be depended upon, for their index errors will in most instances alter. The council refer to the discovery of ozone, and urge all meteorological observers to investigate this branch of the science. Mr. Brooke's Photographic apparatus for registering the movements of the magnets and the readings of the barometer, and wet and dry-bulb thermometers is described; it will be referred to again in a series of papers upon the various meteorological instruments, to be published from time to time in this magazine. The Spanish government have been supplied by Mr. Barrow, with twenty-three sets of instruments, and the Director of the Royal Observatory, Madrid, (Don Manuel Rico Sinobas,) has mentioned the establishment of these meteorological stations.

On the Calabrian coast there are five Observatories; namely, Vengara, Bilboa, Santander, Oviedo, Santiago.

In the Mediterranean climate are six Observatories: namely, Malaga, Alicant, Valencia, Tarragona, Barcelona, and Gerona.

An Observatory is established at Palma, in Majorca, and another on the banks of the Ebro, at Saragossa.

On the Douro are three Observatories; namely, at Soria, Valladolid, and Salamanca.

On the Guadalquiver are three Observatories; namely, at Grenada, Jaen, and Seville.

On the Tagus and the Guadiana, Observatories are established at Albacete, and Cindad Real.

From the above stations most important observations on the climate of Spain must necessarily accrue.

Dr. Sutherland, before leaving England for Africa, procured the necessary standard instruments, for a Meteorological Observatory.

The Crystal Palace has become a Meteorological Station. Fifty thermometers have been distributed about the building, rain-gauges in various aspects on the roof, and a good barometer supplied by Negretti and Zambra.

The following papers were read and printed:—

"On the Meteorology of the Quarter ending December 31st., 1853, and the beginning of the year 1854," by J. Glaisher, Esq., F.R.S.

"Yearly Meteorological Report for 1852, at St. Martins, Isle Jesus, Canada East," by C. Smallwood, Esq., M.D.

"On Medico-Meteorology and Atmospheric Ozone," by Dr. Moffat.

"On a Certain Law in the Direction of the Wind," by C. Bulard, Esq., B. A.

"On the Fall of Rain in the years 1852, and 1853," by J. Glaisher, Esq., F. R.S.

GOVERNMENT AND SCIENCE.

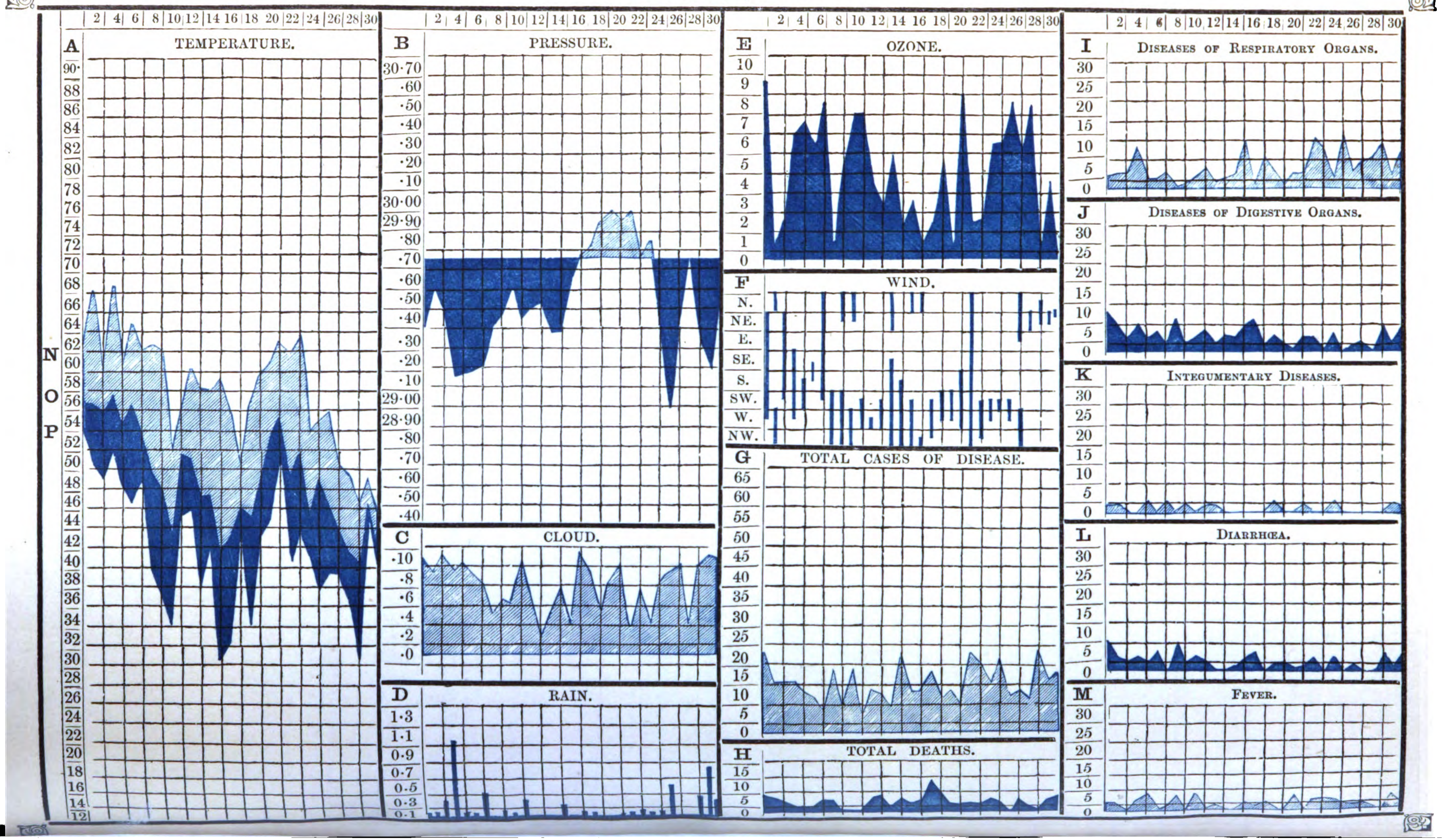
The British Association has published a report containing recommendations to Government respecting the advancement of Science, which, if adopted, will do great things for scientific investigations in Great Britain. The subject is placed under three heads: First—How can the knowledge of scientific truths be most conveniently and effectually extended? Second—What inducements should be held out to students to acquire that knowledge, and after the period of pupilage has expired, to extend it, and turn it to useful account? Third—What arrangements can be made to give to the whole body of competent men of science, a due influence over the determination of practical questions, dependent for their correct solution on an accurate knowledge of scientific principles.

The British Association urges the more extended teaching of science in the universities and schools, and the delivery of lectures in the various public institutions; the formation of schools of mining in such places as Cornwall, of schools of arts and science in such places as Manchester, of schools of navigation in Liverpool, etc., of agriculture in York, etc., forming about thirty schools or colleges, with about six professors in each; the Government to pay a portion, and the students another portion of the expenses. An annual vote of between £18,000 and £27,000, would suffice to carry out this system. With regard to the second subject, more numerous prizes to be provided at our universities, and other inducements and rewards. The formation of museums and public libraries to be encouraged. An appropriate building erected in London in which the principal Societies may be located together. This grant would do more to elevate the character of Great Britain, and at the same time advance science so as to become a public benefit and blessing, than any other grant which has been recommended of late years. Science is so intimately connected with the well-being of mankind, that every encouragement should be given by Government to extend the number of investigators, and in no manner can this be done except by such means as are recommended by the British Association.

METEOROLOGICAL TABLE FOR SEPTEMBER, 1855,
FROM OBSERVATIONS RECORDED AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

Day of the Week.	Day of the Month.	Mean Pressure of the Barometer.	Temperature of the Air.					Force of Wind.	General Direction of the Wind.	Amount of Ozone.		Amount of Rain.	Amount of evaporation	Temp. of evaporation
			Highest.	Lowest.	Range.	Lowest on Grass.	Adopted Mean.			In the night.	In the day.			
		Inches.	Deg.	Deg.	Deg.	Deg.	Deg.	0--6		0--10	0--10	Inches.	Inches.	Deg.
S	1	30.282	65.3	50.5	14.8	45.8	56.0	0.6	NNW & N.	4.5	8		0.185	54.0
S	2	.228	62.4	46.4	16.0	42.1	54.4	2.2	NNE & N.	8	8.5		0.150	52.5
M	3	.042	65.1	49.0	16.1	44.6	55.5	1.0	NNE & N.	8	5.5		0.210	53.9
T	4	29.924	66.1	49.7	16.4	45.2	55.7	0.6	NE & ENE.	9	5		0.145	52.4
W	5	30.000	66.9	46.8	20.1	42.2	53.6	1.2	N & NNE.	9	7		0.150	49.2
T	6	.244	59.2	41.1	18.1	37.7	49.1	0.5	NNE & N.	8	7		0.160	44.7
F	7	.326	66.8	42.4	24.4	37.5	52.7	0.1	ENE & W.	4	4		0.142	48.0
S	8	.131	70.1	41.2	28.9	36.6	55.6	0.5	SW & W.	2	1		0.130	50.9
S	9	.001	71.8	51.5	20.3	47.5	59.4	0.4	NW.	1	5		0.165	55.4
M	10	29.983	71.0	47.1	23.9	42.6	58.0	0.2	NW & ENE.	1	2		0.120	56.7
T	11	.962	74.0	46.1	27.9	40.0	59.2	0.3	NE & NW.	2	0		0.102	55.6
W	12	.966	71.0	46.2	24.8	41.2	58.5	0.1	W & WNW.	1	0		0.122	54.2
T	13	.833	58.6	51.7	6.9	47.8	54.3	0.6	NW & NNE.	2	6	0.319	0.125	52.8
F	14	.867	58.6	47.0	11.6	44.2	52.1	0.5	NE & NNE.	7	3		0.044	47.7
S	15	.924	63.9	44.6	19.3	41.2	54.4	0.2	NE & NW.	1	0		0.072	50.3
S	16	.860	67.0	50.6	16.4	49.5	57.4	0.5	W.	2	0	0.008	0.060	54.1
M	17	.868	66.1	43.0	23.1	38.9	54.6	0.1	WNW.	2	6		0.045	52.4
T	18	.793	67.2	55.8	11.4	53.0	60.1	0.0	E & WNW.	1	0	0.075	0.072	58.0
W	19	.857	71.7	52.1	19.6	50.2	59.5	0.1	NW & ESE.	2	0		0.048	56.0
T	20	.986	70.8	46.5	24.3	43.0	59.1	0.4	SW & W.	1	1		0.078	55.8
F	21	30.114	72.7	49.0	23.7	43.6	59.8	0.3	SW & W.	3	1		0.082	57.7
S	22	.178	74.9	50.1	24.8	46.8	60.4	0.1	WNW & E.	2	1		0.100	58.4
S	23	.228	72.5	48.4	24.1	44.5	58.5	0.4	E & N.	2	8	0.016	0.072	57.5
M	24	.388	61.4	49.4	12.0	50.7	53.5	0.5	NE.	10	0		0.118	48.6
T	25	.280	64.5	45.8	18.7	40.0	53.0	0.3	ESE & E.	1	0		0.142	48.6
W	26	.062	65.5	36.3	29.2	29.0	50.3	0.1	ENE & S.	0	0		0.105	46.0
T	27	29.699	66.9	33.5	33.4	27.5	50.2	0.1	WSW & SSE.	1	0		0.112	46.7
F	28	.332	65.4	45.0	25.4	41.1	55.1	1.1	SE.	8	0	0.050	0.130	57.3
S	29	.422	71.5	53.3	18.5	49.1	60.9	0.2	E & SE.	0	6	0.046	0.079	58.7
S	30	29.342	72.5	54.2	18.3	49.0	62.3	1.0	E & SE.	6	8	0.036	0.084	59.1

OCTOBER, 1855.

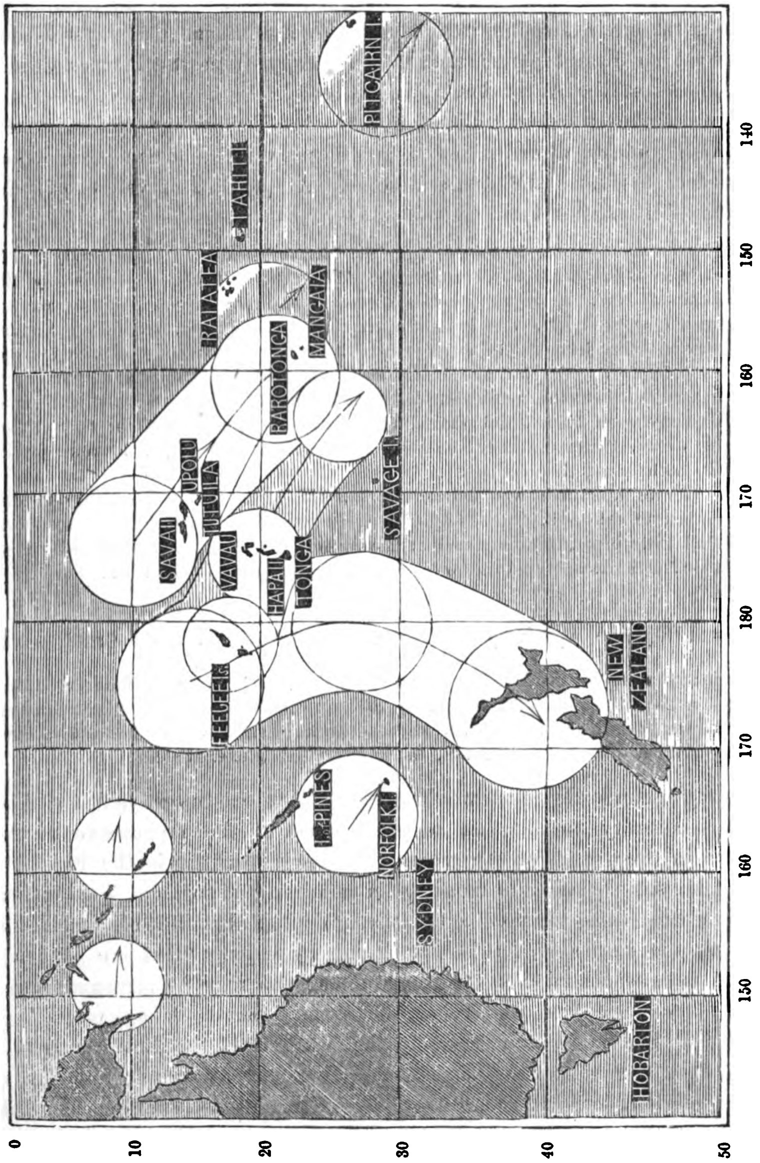


ON THE HURRICANES OF THE SOUTH PACIFIC OCEAN.

BY THOMAS DOBSON, ESQ., B. A.

(Continued from page 79.)

In the two preceding papers I have demonstrated the existence of a storm-track passing from the Feejee Islands to New Zealand; and of another from



SOUTH PACIFIC OCEAN.

Samoa to Rarotonga. I shall now shew that a third storm-track passes from the Feejee group to Tonga, and Savage Island. I possess a considerable number of accounts, more or less complete, of Cyclones in the western portion of the South Pacific; but they may all be referred to one of the three classes just mentioned.

The annexed chart shews the courses of these three normal storm-tracks, among the islands of Polynesia. It will be observed that they cross the route between Sydney, Tahiti, and Panama; which, from its forming an arc of the great circle through Britain and the Australian colonies, will doubtless become at no distant period the great highway from the Mother Country to the Colonies at the Antipodes.

My researches respecting the storms of the Tongan group lead me to a result, as to the direction of progression, very different from those of Commodore Wilkes and Captain Erskine. At page 32 of vol. 3, of "Wilkes' Narrative," it is said that

> "Hurricanes are frequent in this group, (the Tongan,) and occur in February and March, but have also taken place in November and December. The missionaries say that the storms begin at NW, thence veer to the eastward, and end in SE. Houses are levelled, trees torn up by the roots, vessels driven on shore, canoes lost, or driven hundreds of miles away to other islands. In these storms the wind is frequently observed to change from one point to its opposite, and in the same group of islands trees have fallen during the same gale, some to the south and others to the north. They are local in their effects, and fall chiefly upon Hapaii and Vavau, (both north of Tonga.) If the fury of the storm be felt at Vavau, Tonga generally escapes, and *vice versâ;* but Hapaii is more or less the sufferer in both cases, situated as it is between the two places.
>
> A very severe hurricane was felt at Lifuka, Hapaii, in 1834. They vary in duration from eighteen to thirty-six hours. After a destructive one, a famine generally ensues; it destroys all their crops, and numbers of the natives die. The most severe are called 'Afa hija faji,'—'The hurricane that throws down the banana trees.' Earthquakes are frequently felt here."

Captain Erskine, speaking of Tonga, at page 163 of his Journal, says—

> "Hurricanes are common from November to March, and do much damage. They are described as beginning at NW, veering to the eastward, and ending at SE; the wind often changing immediately from one point to its opposite; which would indicate a revolving hurricane with a direction to the NE, the centre passing over the island."

A north-easterly direction would cause the Cyclone to *approach the Equator,* which is contrary to all that is yet known of the progressive motion of Cyclones in every part of the world. As the south-east is the regular trade wind here, some caution is requisite in admitting it to have been either the initial or final component of a Cyclone. Captain Erskine concludes his remarks on the storms of the Tongan group by hoping "that ere long a plan of simultaneous observations of their phenomena may be arranged, as some acquaintance with them will be of the *greatest service to navigators.*"

When at Sydney, I had access to the Journals of the Rev. Dr. Lyth, now Principal at the Wesleyan Missionary College, at Auckland; and for many years a resident missionary at the Feejee Islands; of the Rev. Mr. Rabone, formerly at the same group; of the Rev. Mr. Chartres, late of Raiatea, near

Tahiti; and of the Rev. W. Mills, who has given much attention to the Meteorology of the Navigators' or Samoan group. Through the kindness of these gentlemen, of Messrs. Buzzacott and Pitman, Rarotonga, and others, I have been enabled to compare several Cyclones of the Samoan and Tongan classes. In every case the motion of progression is *towards the south-east.*

I select the following as a type of the Tongan class. The notice of its appearance at Ovalau was given to me by Dr. Lyth, who has likewise published an interesting description of his shipwreck during this storm, in the "Wesleyan Missionary Notices," for September, 1849.

"1848, Island of Ovalau, Feejee group; 17° 42′ S, 178° 40′ E. On Tuesday, the 4th. of April, the wind blew fresh from N, and increased during the night. Towards morning of Wednesday, the 5th., it became a violent hurricane. On Tuesday, the barometer was 29.30 inches, but as the hurricane set in the mercury fell an inch. When the storm was at its height, the wind had got round to the south."

The shift of wind from N to S, shews that the centre of the Cyclone passed over the island to the eastward, early on the morning of Wednesday, the 5th. of April. In the account above referred to, Dr. Lyth says, "the storm was at its height from half-past six to nine, a.m."

In examining the log-books of the missionary brig, John Wesley, at Sydney, I met with the following account of the passage of the centre of this Cyclone, over the meridian of Tonga, about noon of Thursday, 6th. April.

"1848, April 4th. At Tonga. Light east wind. Showery.—Wednesday, 5th. Fresh from NE, with heavy rain. Towards noon the wind increased, and caused a swell. At 7 p.m. the wind still freshening, and the weather looking very threatening. Let go the best bower, and veered out twenty-five fathoms on each cable. Midnight. Blowing very strong at NE.—Thursday, April 6th. A strong gale at NE, with a heavy sea. At 7 a.m. sent down royal yards, and gave the ship more cable. At 10 a.m. wind increased to a hurricane, with very dark weather and torrents of rain. Gave the ship twenty fathoms more cable. Noon. Terrific gusts of wind from E to ESE; the sea wholly covered with foam. Veered out the cable to the last shackle, and housed the top-gallant masts. From noon till 2 p.m. the wind gradually veered to ESE, and moderated a little, but still blowing very hard. At 3 p.m. weather cleared a little, so that we could see the shore, At 6 p.m. moderated, and the rain ceased. Midnight. Moderate and clear.

Friday, April 7th. Wind SE. At 3 p.m. made sail, and weighed from Nukualofu. At 5 p.m. came to at Tangimoodo in ten fathoms. Midnight. Moderate and fine. The mission premises have sustained much damage from the hurricane of yesterday. The large chapel is wholly destroyed. The ship's cables were partially buried in the sheathing of the windlass, owing to the heavy strain caused by the wind and sea.—Saturday, April 8th. Wind SE, moderate and fine.

The hurricane here begins at NE, veers to E and ESE, and ends at SE. The southern portion of the Cyclone, therefore, passed over Tonga, and the centre was moving to the eastward. An extract from the "Seaman's Friend," a Journal published weekly at Oahu, enables us to trace this storm until the 14th. of April.

"1848. The barque Junius for several days had strong gales from the SE and E, and was compelled to lie to.—April 12th. At 2 a.m. wind increased; in topsails. At 3 p.m. a sea struck and stove the larboard boat. At 6 p.m. fore-topmast staysail torn in pieces. Blowing a perfect hurricane, with a heavy sea, lee-rail under water.—April 13th. At 7 a.m.

cut away fore and main top-gallant backstays. A sea carried away the boat. At 9 p.m. topmasts and jib-boom gone; vessel nearly a complete wreck.

April 14th. Wind and sea increasing; barometer falling fast. At 5 p.m. the hurricane at its height; barometer 27.70. Daybreak. If possible, the wind blew harder, the clouds looked blacker, and the rain fell faster, than on the previous evening. Through the day a slight rise in the barometer, about 0.30.—April 15th. Daylight. Wind and sea somewhat abated. Sunset. Weather quite moderate; sea falling fast. Made Savage Island, ten miles distant. 18° S, 169° W.

The hurricane commenced with wind at E or ENE, and veered round to the northward and westward, dying away to WNW, or W."

The Junius probably *drifted* considerably to the westward when lying to during the easterly gales. As the Junius never passed into the western half of the Cyclone, notwithstanding this westerly drift, it is probable that the storm had passed the vertex of its path, and was moving to the westward of south, when it overtook the vessel. This supposition explains the prevalence of strong easterly gales for several days before the hurricane; the progressive motion of a Cyclone decreasing greatly at the vertex of its track.

(To be continued.)

THE WONDERS OF THE ATMOSPHERE.
A POPULAR TREATISE ON METEOROLOGY.

BY EDWARD JOSEPH LOWE, ESQ., F.R.A.S., ETC.

(Continued from page 84.*)*

THE atmosphere in which we are enveloped, is elastic in the highest degree, and the volume or space occupied, depends upon the pressure or weight exerted on it. Air is heavy; if we procure a flask which will hold exactly one hundred cubic inches of air, and exhaust it by means of an air-pump, we shall find the weight will be thirty grains less than when full, or unexhausted, proving that one hundred cubic inches of air weigh thirty grains. The volume of the atmosphere is *inversely* as the pressure, whilst the density and elastic force are *directly* as the pressure and *inversely* as the volume. Let us take an example:—one thousand cubic inches of the atmosphere under a pressure of thirty inches of mercury, would dilate or spread out to two thousand cubic inches, with a pressure of sixty inches of mercury, and would contract to five hundred cubic inches, under a pressure of only fifteen inches.

Mr. Graham has given us the following interesting table upon our atmosphere, from which it will be seen that the height above the sea, in the estimate in this table, has been constructed in arithmetical progression, by the constant addition of 2.705 miles. In this arrangement the volume of air is shewn to be in an increasing geometrical series, whilst the height of the barometer is in a decreasing geometrical series.

Height above the sea, in miles.	Volume of air.	Height of the barometer, in inches.
0.000	1	30.00000
2.705	2	15.00000
5.410	4	7.50000
8.115	8	3.75000
10.820	16	1.87500
13.525	32	0.93750
16.230	64	0.46875

An easy proof of the increasing density of the atmosphere as we approach nearer to the sea-level, is worthy to be quoted as an illustration. A glass bottle, if corked and conveyed to the summit of a mountain, will be broken by the force of the enclosed air *of greater density* not being counterbalanced by the exterior air of the mountain, and the fragments driven *outwards*, for the gas enclosed is under this circumstance too powerful to be held by the bottle. Reverse the experiment; cork another bottle when on the mountain, on descending the bottle will be again broken, but in a contrary manner, and from an opposite cause; the air at the level of the sea being of a much greater density than that enclosed within the flask, the pressure *from without* forces in the sides, the pieces of glass being driven inwardly on all sides.

The vapour of the atmosphere is another condition to be considered; it is most plentiful at the equator, gradually becoming less and less abundant as we near either pole, in tropical regions being retained in the air in an invisible state, as transparent vapour, whereas in colder countries it becomes condensed into clouds. Atmospheric vapour is also most abundant near the surface of the earth, decreasing in amount as we rise into the air. Of course we have been speaking of the average quantity of vapour, for it must be remembered that the absolute quantity is exceedingly partial and irregular, depending much on the arid or humid condition of the surface of our globe. The vapour from the earth ascends into the atmosphere in an invisible state, as minute vesicles of water, until the vesicles reach a stratum or mass of air lower in temperature than these vesicles, they then become in part condensed into *visible* vapour, or, in other words clouds; further condensed produces rain.

The vapour is driven by the winds in various directions, indeed the currents in the atmosphere are the grand agents in atmospheric changes. Near the earth's surface, the currents of air have a somewhat horizontal movement on each other, produced partly by friction; and as the different masses of air frequently differ from each other, with regard to their temperature, amount of vapour, and in the velocity of their movement, to them we are indebted for the production of cloud, the discharge of rain, and the propagation of electricity. The effect of the mingling together of two bodies of air, differing in temperature, is readily shewn. The mass of colder air, by absorbing the heat which, before contact, was sufficient to hold the vapour in a state of solution, at once causes the vesicles to join together and form drops of rain, which speedily fall to the ground by their own weight. If, however, the medium through which the drops fall in their descent be very dry, they will again become evaporated, that is, separated, into numerous smaller drops, small and light enough to enable them to overcome the gravitating power before their arrival on the earth, and hence ascend once more into the atmosphere.

Let us take a practical example of the production of rain as just stated, by the meeting of two volumes of air of unequal temperature; suppose each to contain their maximum quantity of water, the one mass of air having a temperature of 39° and the other of 59°, the elastic force of the vapour of water at 39° is 0.255 of an inch, and at 59° 0.506 of an inch. These two masses of air will, when mingled together, assume the temperature of 49°, but the elastic force of vapour at 49° is 0.361 of an inch, while the mean of the elastic forces of 39° and 59° is 0.381, the tention of the vapour is consequently greater than the air can sustain, therefore the difference, which is 0.020 of an inch, will be condensed, and descend to the earth as rain or fog.

(To be continued.)

THE CHEMICAL AND PHYSIOLOGICAL BALANCE OF ORGANIC NATURE.

BY M. J. DUMAS, AND M. J. B. BOUSSINGAULT.

The above is the title of an excellent essay, from which we shall quote a few extracts:—All animals are incessantly producing carbonic acid, water, azote, and oxide of ammonium; whilst in the vegetable kingdom, plants are as incessantly consuming oxide of ammonium, azote, water, and carbonic acid. What the one gives to the atmosphere, the other takes from it. An animal, chemically speaking, is an apparatus of combustion, by which carbonaceous matters, burnt incessantly, are given back to the atmosphere as carbonic acid; in which hydrogen, burnt incessantly, is returned as water, in which azote is ceaselessly exhaled in the breath, and also parted with in the form of oxide of ammonium. On the other hand, the vegetable kingdom is an apparatus of reduction, where carbonic acid, decompounded, leaves its carbon, water its hydrogen, and oxide of ammonium and nitric acid their ammonium, or their azote. Vegetables and animals come from the atmosphere, and return to it again.

M. Dumas and M. Boussingault have, from experiments, pronounced air to be a *true mixture*, containing by weight two thousand three hundred of oxygen, to seven thousand seven hundred of azote, by volume two hundred and eight of oxygen and seven hundred and ninety-two of azote, and from four ten-thousandths to six ten-thousandths by volume of carbonic acid. Also an almost inappreciable quantity of carborated hydrogen gas. All the animals and people of the earth consume in one year only about fifteen out of one hundred and thirty-four thousand parts of oxygen.

The experiments respecting the respiration of human beings show us some valuable facts. The carbonic acid from the lungs is greater in males than in females. In the male it goes on increasing in the quantity exhaled from the age of eight to thirty; from thirty to forty it is stationary; from forty to fifty it decreases; from fifty to old age the diminution is more rapid; and in old age it becomes about the same as at ten years of age. A male child eight years old, burns 77 grains of carbon in an hour; at fifteen, the quantity has increased to 133 grains; at sixteen, the consumption is 166 grains; between eighteen and twenty it rises to 175 grains; between twenty and forty the quantity remains at about 187 grains; between forty and sixty at 155 grains; from sixty to eighty it is 95 grains; and at one hundred only 90 grains. The female exhales always less than the male, and from the time she becomes a woman the increase ceases. Women consume only 98 grains; yet at the age of from forty to fifty, the amount increases to 129 grains per hour; but from fifty to sixty it has fallen to 112 grains; and from sixty to eighty to 105 grains; and at eighty-two no more than 92 grains.

ON THE EXTREME MINUTENESS OF BODIES.

Gold and silver are susceptible of extraordinary divisibility. In gold lace, the silver thread is coated with gold so attenuated that the quantity in a foot of the thread weighs less than one-sixthousandth part of a grain. This lace could be divided into parts, a hundred of which would only be equal to an inch in length; and although easily seen, the gold in each part would be only the seven million two hundred thousandth part of a grain. Place one of these minute parts in a microscope, using a power of five hundred, and then it can be again divided 3,600,000,000 times, yet each part would shew the gold the same.

A single grain of blue carmine will tinge blue ten pounds weight of water: this water will contain six hundred and seventeen thousand drops. Supposing one hundred particles is required in order to give tint to each drop, then the grain of carmine has been subdivided sixty-two million times.

A grain of musk is sufficient to scent powerfully a large room, the scent lasting for years. What an innumerable number of particles of musk must radiate from this single grain every second of time, in order to make the scent perceptible in every direction.

M. Biot informs us that the thread of the common spider is composed of more than six thousand single threads.

The human blood, which looks a uniform red mass, consists of innumerable red globules swimming in a transparent fluid, *(serum.)* The diameter of each globule is less than the four-thousandth of an inch; therefore each drop of blood contains more than a million red globules.

The minuteness of organized life is best shewn in *Infusoria*. Some are so small that millions heaped on each other do not equal a grain of sand in size, and thousands might swim at once through the eye of the finest needle. Ehrenberg tells us that the shells and coats of mail of diminutive animals exist in such vast quantities, as to form large rocks: the slate-stone near Bilin, in Bohemia, is mainly composed of them. Each cubic inch contains forty-one thousand millions. The weight of a cubic inch is two hundred and twenty grains, therefore each animal weighs no more than the one hundred and eighty-seven millionth of a grain. How indescribably minute must be their organs of respiration, their digestive organs, and the organs of reproduction; their blood-vessels, and the blood which circulates within their veins.

OBSERVATIONS ON ATMOSPHERIC ELECTRICITY.

BY THE LATE HENRY LAWSON, ESQ., F.R.S., F.R.A.S., ETC.

The following observations were handed over to the Editor by the late Henry Lawson, Esq., of Bath; they were the result of experiments with an exploring wire:—

July 1st., 1821. 7h. 50m. a.m. no electricity; 3h. 30m. p.m., electricity positive, bells rang strongly, wind W, temperature 62°; 3h. 35m. bells ceased ringing; 3h. 45m. negative, bells ringing violently; 3h. 58m. electricity positive; 4h. 10m. cork ball electrometer opened and closed repeatedly, a halo noticed round the cork balls of a pinkish white colour; 4h. 18m. negative; 4h. 29m. bells ceased ringing; 6h. 45m. air conducted, cloudy, rising barometer.

July 23rd., 1821. 7h. 30m. a.m. electricity positive, gold leaves striking the sides every 40 sec., wind SSW, rising barometer, temperature 59°; 8h. 28m. positive, gold leaves striking every 10 sec., wind W; 10 a.m. bells rang, wind SW, temperature 54°, negative; 11h. 20m. positive, bells ringing; 11h. 26m. negative; 11h. 47m. constant changes from positive to negative, powerful. At 4h. 15m. p.m. still constant changes; 11h. 46m. air conducts every 20 sec., rising barometer, temperature 55°.

March 10th. 1822. 8h. 20m. a.m. air conducts every 9 sec., high wind; 9h. no electricity; 2h. 55m. p.m. electricity positive, heavy cloud approaching; 11h. 45m. electricity negative, bells ringing violently, severe hail storm, violent wind, barometer rising.

March 30th., 1822. 10 a.m. air conducts every 50 sec., windy; 11h. 20m. electricity negative, bells ringing hard, rain, in 5 sec. positive, and in 3 sec. more no electricity. At 1h. 40m. p.m. rain and hail, bells ringing strongly; 1h. 40m. rain ceases, and bells cease ringing; 1h. 42m. bells ring, negative, then up to 3h. 35m. constant changes from positive to negative.

May 25th., 1822. 9h. 11m. a.m. no electricity, air insulates; 11h. 5m. negative, rather feeble; 11h. 33m. bells ring, a shower; 11h. 43m. bells cease, electricity positive; 12h. 5m. p.m. negative and powerful; 12h. 25m.

still negative, and very powerful; 2h. 5m. positive, bells ring, loud clap of thunder, a flash of lightning, electricity negative, a second flash, negative; a white halo round the cork balls, rain, in one minute bells ring, positive, then gradually become negative; soon after bells ring, and the cork balls, viewed through a good achromatic opera-glass, gradually become coloured *blue* on left-side, and *dusky yellow* on right-hand side, balls close and the colour vanished; electricity soon negative, bells ring, balls coloured blue on right, and yellow on left-side; balls collapse and re-open, positive, having a pink atmosphere, which is plainly seen when viewed through a telescope of fourteen inches focal length, balls collapse and re-open, negative, and become coloured red on right, and blue on left-side.

June 15th., 1822. 10h. 30m. a.m., electricity positive, bells ringing briskly, heavy rain. 6h, 50m. p.m., bells ringing again, distant thunder; electricity positive all day; at midnight air conducted every three seconds.

July 28th., 1822. 8h. 25m. a.m., air iusulates, thunder-clouds, wind ESE, temperature 65°, showery, some showers electrical, others not, none to make the bells ring. At 6h. 30m., a shower, positive, pith-balls expanded, clearly saw a *blue* atmosphere on their upper portion, and a *yellow* atmosphere on their under side; the balls collapsed; and springing open again distinctly saw this atmosphere blue on the right-side and yellow on the left; rain soon after and electricity ceased.

July 29th., 1822. 8h. 50m. a.m., positive. 5h. 35m. p.m., negative, bells ringing, rain heavy, electricity positive, rain increases, bells cease ringing, rain decreases, negative; positive, and rain heavier, balls collapse and gradually open, negative, and rain ceases; in fifteen minutes bells ring, positive, soon bells cease, and in twenty minutes positive, and bells again ring. 10h. 55m. p.m. air conducts.

July 1st., 1823. 7h. 55m. a.m., air conducts. 12h. 30m. p.m., negative. 1h. 35m., distant thunder. 1h. 39m., positive, bells ring. 1h. 47m., bells ring with negative electricity, rain commenced and they ring with positive electricity. 2h. 10m. p.m., bells ring, positive, slight rain; electricity negative, pith balls expanded; an intensely *blue* atmosphere noticed on their upper part, and an *orange* atmosphere on their lower half. 2h. 32m., positive. 2h. 34m., negative, heavy rain, bells ringing. 2h. 37m., ringing with positive electricity. 2h. 43m., with negative, rain heavy. 3h. 10m., with positive, no rain. 3h. 30m., rain, bells ring, negative. 3h. 38m., positive. 6h. 23m., still positive, and bells ringing, rain.

July 26th., 1823. 8h. 14m. a.m., negative, rain, bells ring for twenty minutes, then ring positive for three minutes, then in one minute negative. At 9h. 5m. p.m., bells ring positive, rain.

August 26th., 1823. 8h. 26m. a.m., bells ringing negative, distant clap of thunder. At 6h. 50m. p.m., ringing negative. At 6h. 53m. p.m., ring positive, rain.

The electrical atmosphere noticed on several occasions is remarkable, and deserves careful investigation; of its existence there can be no doubt.

NEW PLANETS.

On the 5th. of October, M. Luther, of the Bilk Observatory, in Prussia, discovered another new Planet, which has received the name of *Fides*. This is the fifth Planet M. Luther has detected, the other four being *Thetis, Proserpine, Bellona*, and *Leucothea*.

On the same evening, M. Goldschmidt discovered, at Paris, a Planet which has received the name of *Atalante*. This astronomer had previously found two other Planets, namely, *Lutetia* and *Pomona*.

There are thus thirty-seven of the *asteroides* at the present date.

OCCULTATIONS OF STARS BY THE MOON, IN DECEMBER, 1855.

On the 12th. the Star B.A.C., 7077, (the sixth magnitude,) disappearance 4h. 25m. p.m., reappearance 5h. 35m. p.m., disappearance on dark limb, and reappearance on bright limb.

On the 15th. Psi. 3 Aquarii, (fifth magnitude,) disappearance 3h. 8m. p.m., reappearance 4h. 15m. p.m., disappearance on dark limb, and reappearance on bright limb.

On the 21st., 32 Tauri, (sixth magnitude,) disappearance 2h. 30m. a.m., on the dark limb, reappearance 3h. 27m. a.m., on bright limb,

On the 24th., c. Geminorum, (sixth magnitude, disappearance 11h. 43m. p.m., on bright limb, reappearance 25th., 12h. 38m. a.m., on the dark limb.

CALENDAR OF NATURE FOR OCTOBER, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGAM.

BY THE EDITOR.

Oct. 1st. up to 8th.—Vast numbers of the Turnip Fly, *(Aphis Brassicæ.)*

7th.—Great many Caterpillars on cabbages. Great many Hawk-flies in turnip fields.

10th.—Mushrooms abundant to-day, they had been very scarce. Saw a Wild Goose.

12th.—Caterpillars going into the chrysalis state.

13th.—Damson plums ripe. Peaches over.

14th.—Some Sycamores leafless; and Chesnuts, Limes, and Beeches nearly leafless. The pastures much eaten with grubs.

21st.—Several swallows seen for the last time.

24th.—Still many mushrooms.

Apples very abundant, many sold at threepence and fourpence a peck, great crops of peaches, nectarines, apricots, plums, pears, acorns, hedge-berries, barberries,, hewberries, etc.

MINERAL SUBSTANCES IN PLANTS.

Nitrogen is abundant in the sap of young plants, eventually becoming fixed plentifully in the seeds and young leaves. Potash and soda circulate in the sap, and fix themselves in the green fleshy leaves and in bulbous roots. Sulphuric acid, abundant where the potash and soda are. Phosphoric acid fixing itself in the seeds and reproductive parts of plants. Lime in the sap, depositing itself in the leaves and bark, and in some seeds and roots. Magnesia in the sap, becoming fixed in the seeds. Chlorine, chiefly with the soda. Silica in the sap, in a soluble form, becoming deposited chiefly in the exterior portion of the stems and leaves, giving strength to the plant. Flint is found on the exterior of all the graminaceous order, and produces the polished surface of the cane-palm. Sulphur abounds in cruciferous plants, especially in mustard. Copper in coffee, wheat, etc.; and iron in tobacco, and in the fruit of the strawberry.

HISTORY OF THE THUNDER-STORMS WHICH HAVE OCCURRED AT THE HIGHFIELD HOUSE OBSERVATORY, FROM JANUARY, 1841, TO JANUARY, 1856.

BY THE EDITOR.

So many phenomena are observable in thunder-storms, and so much interest is attached to the reduction of observations on this class of Meteorological investigation, that it will not be without considerable interest, comparing the various features which have from time to time taken place. Before describing this portion of the storms, a brief account of each will be given.

1841. January 2nd., violent at night, hail, boisterous wind, with much lightning. For a few days previous the weather had been mild. The storm was followed by five days incessant snow, which on the 6th. was four inches deep. A lengthened frost with much snow afterwards.

, , March 17th., with heavy rain and hail, much thunder and lightning, boisterous cold wind.

, , March 27th., in the evening a hail-shower.

, , March 31st., in afternoon and evening constant hail-showers.

, , March 31st., in the night a thunder-storm with hail and rain, and at 2 a.m. a tremendous gale of wind.

, , April 11th., at 12h. 30m., p.m., hail-storm with large stones. Windy.

, , April 15th., heavy showers of hail with thunder, rain and wind. Mild.

, , April 18th., hail-storms in evening with rain; heaviest 6 minutes before midnight.

, , April 20th., at 3 p.m., hail-showers with wind.

, , April 21st., at 3 p.m., and again at 4 p.m., hail-showers.

, , April 28th. 7h. 30m., p.m., distant lightning.

1841. May 1st., 8h. 30m., p.m., thunder and lightning.

, , May 7th., thunder-storm began at 12h. 30m., p.m., and ended at 1h. 45m., thunder and lightning, large hail-stones, heavy rain and rough wind.

, , May 8th., 12h. 45m., p.m., violent, with hail, rain, and wind. Thunder nearly all day.

, , June 16th., lightning at night.

, , June 17th., lightning at night.

, , June 18th., from 3h. 30m., p.m., till 5 p.m., violent; much thunder and lightning, heavy rain and wind. The day had been dull and very sultry.

, , June 22nd., 5 p.m., slight thunder-storm; barometer stationary.

, , June 23rd., 6 p.m., slight thunder-storm; barometer falling.

, , June 24th., from 8 a.m. till 10 p.m., thunder-storms, with falling barometer. The morning warm, with few clouds. Storms distant till 1 p.m., then a slight one passed over; at 2 p.m. a heavier; and at 4 p.m. two storms met, one from south and the other from east, violent; very heavy rain, by 7 p.m. distant; thunder heard till 8 p.m.; again at 10 p.m. much loud thunder, and vivid lightning.

, , June 29th., 2h. 10m., p.m., thunder-storm with rain; barometer falling.

, , July 3rd., 5 p.m. slight, with heavy rain; barometer falling.

, , July 15th., from 8 a.m. distant all day; thunder very loud at 5 p.m., very hot; rising barometer.

, , July 18th., from 5 till 7 p.m., distant; barometer rising.

, , August 4th., from 11 a.m. all day and evening with much lightning, showery and windy; barometer rising.

, , August 5th., distant all day, nearest at 7 a.m., with constant showers, much lightning at night, windy; barometer falling.

, , August 17th., between 4 and 6 p.m. with lightning and heavy rain; barometer rising.

, , August 21st., 7 a.m., distant; barometer stationary; fine and very hot.

, , August 23rd., 10 p.m., much lightning; barometer rising.

, , September 3rd., lightning at 2 a.m., very rainy night; barometer falling.

, , September 6th., from 10 a.m. to 2 p.m., hail-showers, and from 2 till 5 p.m., thunder-storm; barometer falling.

, , September 14th., from 8 a.m., all day, storms; much lightning at night; barometer stationary.

, , October 10th., hail; falling barometer.

, , October 17th., hail at 8 a.m.

, , December 3rd., hail at 10 a.m.

, , December 6th., 7 p.m., vivid lightning; rising barometer.

, , December 10th., 8 p.m., vivid lightning; falling barometer.

1842. January 22nd., all day constant showers of hail, snow, sleet, and rain; barometer stationary.

, , January 26th., all day hail and snow; falling barometer.

1842. March 9th., noon, hail-showers; falling barometer.
,, March 23rd., 9 a.m., till 5 p.m., violent hail-storms.
,, April 23rd., in evening distant thunder-storm. In morning of 22nd. had been a violent snow-storm.
,, April 24th., lightning at night.
,, May 6th., in afternoon hail-storm.
,, May 31st., lightning at night.
,, June 4th., in evening distant thunder-storm.
,, June 12th., at night distant lightning.
,, June 13th., at night distant storm.
,, June 18th., from noon, storms.
,, June 19th., from 7 a.m., till 10 p.m.
,, June 20th., from 11 a.m., till 10 p.m.
,, June 21st., from 9 a.m., all day.
,, June 22nd., from 2 p.m., till 9 p.m.
,, July 2nd., storms.
,, July 17th., in evening, distant.
,, July 18th., distant thunder and lightning.
,, July 19th., in afternoon, distant.
,, July 20th., distant.
,, July 26th., in evening.
,, July 27th., in evening both thunder and lightning.
,, August 10th., afternoon storm, and distant in evening and all night.
,, August 29th., lightning at night.
,, September 6th., lightning at night.
,, September 7th., lightning at night.
,, September 10th., afternoon, distant thunder-storm.
,, October 27th., in evening, heavy hail-storm; wind N.
,, November 3rd., at noon, heavy hail-storm; wind N.
,, November 4th., in morning and at noon, heavy hail-storm; wind NE.
,, November 5th., in morning, heavy hail-storm, lightning at night; wind NE.
,, November 8th., lightning at night; wind N.

ADDITIONAL REMARKS.

1842, May 31st., wind W; June 4th., NW; June 12th., E; June 13th., E; June 18th., E and NE; June 19th., ENE; June 20th., S; day before, E and NE; day after, W and SW; June 21st., W and SW; day before, S; day after, SW; June 22nd., SW; July 2nd., SW; July 17th., E; July 18th., E; July 19th., E; afterwards SE; July 20th., NE; before the storm, SE; afterwards, E; July 26th., W; July 27th., NW; before storm, W; August 10th., S; before and after, W; September 10th., SW; before, W; afterwards, NE.

June 18th., greatest heat, 70°; July 1st., 68°; July 17th., 73°.

Epoch. 1842.	Greatest Heat on the day after.	Min. Temp. Deg.	Max. Temp. Deg.	Mean Pressure. Inches.
April 23		39	58	30.0 R.
" 24		43	59	30.0 R.
May 6		42	58	29.1 F.
" 31		53	67	30.1 S.
June 4	71	46	75	30.2 F.
" 12	70	53	80	30.3 F.
" 13		52	80.5	30.2 S.
" 18	65	50	70	29.9 F.
" 19	65	50	65	29.7 F.
" 20	65	50	65	29 6 F.
" 21	65	50	65	29.5 S.
" 22	66	52	65	29.6 R.
July 2	66	54	68	29.8 R.
" 17		54	73	29.9 F.
" 18	71	51	72	29.8 S.
" 19	69	52	71	29.8 S.
" 20	68	53	69	29.6 S.
" 26	69	49	70	30.0 R.
" 27	68	55	69	30.2 F.
August 10	68	59	82	29.6 F.
" 29	73	54	78	30.0 S.
September 6		50	69	30.1 S.
" 7	53	44	67	29.6 F.
" 10	63	52	62	29.3 R.
October 27		38	42	
November 3		40	57	
" 4		33	56	
" 5		32	50	
" 8		34	44	

To be Continued.

THERMOMETRICAL OBSERVATIONS MADE BY THE LATE MATTHEW NEEDHAM, ESQ., AT LENTON GROVE, (A DISTANCE OF ABOUT 200 YARDS N.W. OF THE HIGHFIELD HOUSE OBSERVATORY.)

TEMPERATURE OF JANUARY, BETWEEN 1810 AND 1840.

1810.—MEAN temperature at 8 a.m., 33.5°; at 9 a.m., 34.5°; and at 11 p.m., 34.5°; adopted mean 35.2°. The first five days were mild, the temperature at the three hours of observation, ranging between 43° and 50°; being 49.5° at 11 p.m. of the 4th., and 50° at 8 a.m. and 9 a.m. of the 5th. Between the 6th. and 11th. ranged from 38.5° to 47.5°; at 11 p.m. on the 12th., was 33°. From 13th. to 22nd., frosty, ranging between 15° and 31.5°; the 15th., cold at 8 a.m. and 9 a.m., 21°; and at 11 p.m. 17°. On the 16th. was 24° at 9 a.m.; and 17½° at 11 p.m.; on 19th., 17½° at 8 a.m.; 20th., 17° at 11 p.m.; 21st. 15° at 8 a.m.; frosts on the 22nd., and 24th. to 31st., ranging between 26° and 35°, except at 11 p.m. on 31st., when it was 45°. On sixteen days there were frosts at 8 a.m.; on fifteen days at 9 a.m.; and on fifteen days at 11 p.m.

1811.—Mean temperature at 8 a.m., 31.7°; and at 11 p.m., 33.0°; adopted mean 33.4°. From the 1st. to the 10th., frosty, temperature ranging between 21° and 32°, being 21° at 8 a.m. on the 10th.; 23.5° at 8 a.m. on the 8th., and 24° on the 3rd. at 11 p.m.; at 11 p.m. on the 10th. 36.5°; from the 11th. to the 20th., ranged between 35° and 45°; being 45° at 8 a.m., on the 17th.; was 32° at 11 p.m., on 21st. From 22nd. to 26th., ranged between 28.5° and 37.5°, except at 11 p.m. on the 26th., when 44.5°; was 28.5° at 8 a.m. on the 22nd; and 32° at 8 a.m. on 25th.; at 8 a.m. on the 27th., 36.5°; then sharp frosts to the 30th., ranging between 14° and 20.5°, except at 11 p.m. on the 30th., when 30.5°; was 14° at 8 a.m. on 29th.; 15° at 8 a.m. on 30th.; 18° at 8 a.m. on 28th.; on the 31st., was 30° at 8 a.m., and 42.5° at 11 p.m. On sixteen days frost at 8 a.m., and on fourteen days at 11 p.m.

1812.—Mean temperature at 8 a.m. 35°; and at 11 p.m. 37.5°. Mean minimum temperature 30°, and mean maximum temperature 39.8°; adopted mean from observations at 8 a.m. and 11 p.m. 37.3°; from those of self-registering instruments 34.6°; and from the two sets of observations 35.9°. The minimum temperature ranged between 24° and 38°; being 24° on the 21st. and 22nd.; 25° on the 5th. and 23rd.; 26° on the 6th., 15th., 16th., and 24th.; was 38° on the 28th. and 29th.; and 37° on the 18th. and 27th. The maximum temperature ranged between 34° and 48°; being 34° on the 4th. and 5th.; 35° on the 3rd. and 21st.; and 36° on the 16th.; was 48° on the 19th.; 47° on the 28th.; 46° on the 30th.; 45° on the 27th. and 31st. Frosts occurred on twenty-five nights; and on eleven days frosts at 8 a.m.; and on one night at 11 p.m.

1813.—Mean temperature at 8 a.m., 34°; and at 11 p.m., 34.6°. Mean minimum temperature 28°; and mean maximum temperature 37°; adopted mean from observations at 8 a.m., and 11 p.m., 35.4°; adopted mean from those of self-registering instruments, 32.3°; adopted mean from the two sets of observations, 33.8°. The minimum temperature ranged between 26° and 39° from 1st. to 8th.; being 26° on the 1st., and 39° on the 5th.; ranged between 25° and 32°, from 9th. to 31st.; except on 28th., when 14°; and 27th., when 15°; and 22nd., when 21°. The maximum temperature ranged between 40° and 47°, to the 9th.; except on the 6th., when 51°; between 30° and 37°, to the end of the month; except on the 28th., when 26°; and 31st., when 44°. Twenty-five frosty nights; at 8 a.m. nine frosts, and at 11 p.m. eight frosts.

1814.—Mean at 8 a.m., 24.9°; at 11 p.m., 26.5°. Mean minimum, 19.0°; mean maximum, 30.5°; mean from observations at 8 a.m., and 11 p.m., (corrected for diurnal range) 26.8°; mean from self-registering thermometers, (corrected for diurnal range) 24.5°; adopted mean 25.6°. Frosts occurred on every night; and on 22 days the greatest heat of the day did not rise above the freezing point. The greatest cold was 3° on the 13th.; 4° on the 9th.; 9° on the 17th.; 10° on the 16th. and 20th.; 11° on the 24th.; 15° on the 4th.; 15½° on the 1st.; 16° on the 6th., 14th., 15th., and 22nd.; 17° on the 21st.; 18° on the 8th., 11th., and 12th.; 20° on the 2nd. and 3rd.; 21° on

7th.; 22° on the 10th. and 18th.; 23° on the 23rd. and 30th; 25° on the 31st.; and between 26° and 31° for the remainder of the month. The greatest heat of the day was only 23° on the 14th.; 20° on the 17th; 24° on the 11th.; and 25° on the 15th. Between 26° and 32° on the 2nd., 3rd., 4th., 7th., 8th., 9th., 10th., 12th., 13th., 16th., 18th., 20th., 21st., 22nd., 23rd., and 24th.; rising as high as 39° on the 30th.; and being between 34° and 38° on the 25th., 26th., 27th., 28th., 29th., and 31st. At 8 a.m. there were on twenty-five days frost; and at 11 p.m. twenty-six frosty nights.

1815.—Mean at 8 a.m. 30.3°; 11 p.m. 31.7°. Mean minimum 25.3°; adopted mean 31.6°. The minimum temperature fell below the freezing point on 30 nights; falling to 11° on the 23rd.; to 12° on the 24th; to 19° on the 5th.; 20° on the 6th., 8th., and 19th.; 21° on the 12th. and 26th.; and to 23° on the 2nd., 3rd., 4th., 15th., and 22nd.; and being as high as 33° on the 9th. At 8 a.m. there were twenty frosty days; and at 11 p.m. seventeen frosty nights.

1816.—Mean at 8 a.m. 35°; and 11 p.m. 36.4°; adopted mean 36.8°. There were, at 8 a.m., eight frosty days; and at 11 p.m. seven frosty nights. On the 30th. the temperature was, at 8 a.m., 22°; and at 11 p.m. 24°; at 11 p.m., on the 8th. and 10th., 49°; and at 8 a.m., on the 6th., 48°. The weather was warm from the 4th. to the 11th.; and coldest from the 28th. to the 31st.

1817.—Mean at 8 a.m. 38°; and at 11 p.m. 38.6°; adopted mean 39.4°. There were, at 8 a.m., six frosty days; and at 11 p.m., five frosty nights. At 8 a.m. on the 10th. and 16th., and at 11 p.m. on the 15th., the temperature was 23°; at no other time, at these hours, was it below 29°. It was 52° at 11 p.m., on the 24th.; at 50° at 8 a.m., on the 25th. The weather was hot on the 1st., 4th., 18th. to 20th., 22nd. to 27th., and 29th. to 31st.

1818.—Mean at 8 a.m., 38.6°; and at 11 p.m., 38.6°; adopted mean 39.7°. There were, at 8 a.m., six frosty days; and at 11 p.m. two frosty nights. On the 1st., at 8 a.m., 23°; and on the 2nd., 3rd., 19th., 23rd., and 27th., 32°; at 11 p.m., on the 1st. and 2nd., 32°. It was 52°, at 8 a.m., on the 15th.; 50°, at 8 a.m., on the 13th.; 49°, at 8 a.m., on the 10th., and at 11 p.m., on the 15th. The weather was hot on the 5th. to 16th., 19th. to 22nd., 24th. to 26th., and on 30th.

1819.—Mean at 8 a.m., 37.5°; and at 11 p.m., 38.3°; adopted mean 39.0°. There were, at 8 a.m., four frosty days; and at 11 p.m., two frosty nights. On the 1st., at 8 a.m., 27°; and at 11 p.m., 25°; at no other date at these hours did it descend below 30°. The temperature was as high as 47°, at 8 a.m., on the 17th.; and 11 p.m. on the 10th. The weather was warm on the 4th., 5th., 7th., 9th., 10th., 11th., 13th. to 15th., 17th. 18th., 28th. to 30th.

1820.—Mean at 8 a.m., 28.5°; and at 11 p.m., 30.5°; adopted mean 30.6°. Number of frosts, at 8 a.m., twenty; and at 11 p.m., nineteen; at 8 a.m., was 6½° on 1st.; 10° on 5th.; 14° on 15th.; 16° on 4th.; 17° on 22nd.; on other days ranging between 21° and 31°, up to the 23rd., except on

7th., when 33°; 11th. 36°; and 19th. 34°; from 24th. to end, between 38° and 45°, except on 29th., when 33°. At 11 p.m., was 10° on 14th.; 11° on 4th.; and 20° on 22nd.; on other days ranged between 21° and 30°, up to 22nd., except on the 6th. and 10th., when 35°; and 11th. 33°; from 23rd. to 29th., between 38° and 45°; on 30th. was 46°; and 31st. 47°.

1821.—Mean at 8 a.m., 36.9°; at 11 p.m., 38.1°; adopted mean 38.6°. At 8 a.m. temperature 24° on 4th.; and 26° on 3rd.; and 28° on 2nd.; on other days between 30° and 37°, up to the 12th; then between 39° and 49°, up to 23rd., except on 15th., when 34°; on 24th. 30°; on 25th. 43°; then 33° and 34°, except on 30th., when 41°; and 31st., when 40°. At 11 p.m., on 2nd., 23°; on 3rd. 28°; 23rd. 29°; 1st. and 4th. 30°; and 5th. 31°; from 6th. to 11th., between 34° and 36°; from 12th. to 25th., between 41° and 49°, except on 14th., when 34°; 18th., when 52°; 20th., when 38°; 23rd., when 29°. Then between 36° and 40°, except on 27th., when 33°; and 30th., 46°. Number of frosts at 8 a.m., six; and at 11 p.m., six.

1822.—Mean at 8 a.m., 39.6°; and at 11 p.m., 40.2°; adopted mean, 41°. Number of frosts at 8 a.m., five; and at 11 p.m., three. At 8 a.m., up to 8th., between 31° and 38°; from 9th. to 15th., between 38° and 48°; 16th. 30°; 17th. 32°; from 18th. to 29th., between 42° and 47°, except on 27th., when 35°; on 30th. 31°; and 31st. 36°. At 11 p.m., up to 9th., between 32° and 39°, except on 8th., when 41°; from 10th. to 28th., between 41° and 47°, except on the 15th. and 16th. 32°; and 26th. 38°; on 29th. 34°; 30th. 35°; and 31st. 41°.

1823.—Mean at 8 a.m., 29.6°; and at 11 p.m., 31.2°; adopted mean 31.4°. There were nineteen frosts at 8 a.m., and eighteen at 11 p.m. At 8 a.m. temperature 27° on 1st.; between 34° and 39° up to 8th.; was 27° on 9th.; between 20° and 30° to 18th.; was 6⅓° on 19th.; between 21° and 31° up to 27th., except on 23rd., when 14°; 28th. 38°; 29th. 44°; 30th. 41°; 31st. 40°. At 11 p.m., 30° on 1st.; between 34° and 46° to 10th., except on 9th., when 27°; between 24° and 29° up to 15th.; 31° on 16th. and 17th.; 17° on 18th. and 19th.; 32° on 20th.; then to 26th. between 26° and 29°, except on 22nd. 15°; on 27th. 34°; then to end between 39° and 45°.

(To be continued.)

THE GALE OF THE 25th. AND 26th. OF OCTOBER, 1855. AT THE BEESTON OBSERVATORY.

The wind, which had been WSW, moved to SW at 10 a.m., (25th.) and the gale commenced, the direction remaining the same up to 5h. 15m. a.m. of 26th.; (the force of this gale will be seen by referring to page 121.) At 5h. 15m. a.m. the wind became W, and a thunder-shower commenced with violent hail and rain, lasting fifteen minutes, and in this time 0.379 of an inch of rain fell. At 5h. 45m. a. m., wind WSW; and at 6h. 15m. a.m., SW.

At midnight temperature 55°, increasing gradually to 56° at 5 a.m.; as soon as rain-storm commenced fell rapidly to 48.8°, and on grass to 48.3°; yet the temperature of the rain was only 32.1°; the coldness of this rain lowered the temperature of the air 8.7°. The mean angle of the air during the gale, was an upward current of about 45°. Electricity positive and feeble, except at 5h. 15m., when negative and powerful; at 6 a.m. again positive. From the commencement of the gale up to 5 a.m., the barometer fell rapidly, (corrected to the altitude of 181 feet,) it was, at 10 p.m., 29.158 inches; at 2 a.m. 28.963 inches; and at 5 a.m. 28.813 inches; at 5h. 15m. a.m. it had risen to 28.860 inches; and at 10 a.m. was 28.863 inches. The amount of rain fallen at Highfield House was 0.524 of an inch.

The heavy storm of rain, at the termination of the gale, begun at the following time, at the undermentioned places:—Beeston Observatory, 5h. 15m. a.m. Norwich, 5h. 55m. Rugby, 5h. Oxford, 7h. 30m. Farnham, (Surrey,) 8h. 25m. London, 8h. 45m. Steyning, (Sussex,) 9h. 30m.

The rain at Rugby and Norwich must have been that of a different storm, as the speed would be much too great to reconcile this with those of the other stations. The speed from Beeston to Oxford and Farnham was thirty-six miles an hour; and to London and Sussex thirty-two miles, the mean speed being about thirty-four miles an hour.

AMOUNT OF RAIN FALLEN AT HIGHFIELD HOUSE, IN OCTOBER, DURING THE PAST TWELVE YEARS.

1844,	1.6 inches,	1850,	2.1 inches,
1845,	1.7 "	1851,	2.1 "
1846,	4.3 "	1852,	2.9 "
1847,	2.4 "	1853,	3.3 "
1848,	4.7 "	1854,	0.9 "
1849,	3.1 "	1855,	4.5 "

AMOUNT OF RAIN FALLEN IN OCTOBER, 1855.

	Inches.
Arbroath, A. Brown, Esq.	1.95
Observatory, Beeston.	3.32
Boston, T. Collis, Esq.	3.83
Leeds, H. Denny, Esq.	4.22
St. Paul's Parsonage, Wigton, Rev. F. Redford,	4.22
Highfield House Observatory,	4.46
Royston, H. Wortham, Esq.	4 99
Grantham, J. W. Jeans, Esq., F.R.A.S.	5.20
Manchester, G. V. Vernon, Esq.	5.21
Rose Hill, Oxford, Rev. J. Slatter, F.R.A.S.	5.37
Belvoir Castle,* W. Ingram, Esq.	5.61
Berkhampstead.	5.80
Worcester Observatory, N. Edis, Esq.	6.01
Lampeter, Rev. J. Matthews.	6.86
Newport, Isle of Wight, J. C. Bloxam, Esq.	7.10
Bolton, H. H. Watson, Esq.	8.01

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* Omitted August 1.87 inches, and September 0,61 of an inch.

RAIN-FALL IN GREAT BRITAIN,
FOR THE QUARTER ENDING SEPTEMBER 30TH., 1855.

	Inches.
Jersey, Rev. S. King, F.R.A.S.	5.2
Guernsey, Dr. Hoskins, F.R.S.	7.5
Helston, M. P. Moyle, Esq.	5.5
Falmouth, L. Squire, Esq.	5.6
Truro, H. C. Hodge, Esq.	4.2
Teignmouth, W. C. Lake, Esq.	5.1
Exeter, W. H. Ellis, Esq., and H. S. Ellis, Esq., F.R.A.S.	6.6
Ventnor, Dr. Martin.	6.5
Newport, J. C. Bloxam, Esq.	7.2
Ryde, B. Barrow, Esq.	5.7
Worthing, W. G. Baker, Esq.	4.5
Patrixbourn, (Kent,) Rev. M. A. Smelt.	5.8
Clifton, W. C. Burder, Esq.	7.1
Lewisham, W. Richardson, Esq.	8.1
Royal Observatory, The Astronomer Royal.	7.2
St. Thomas' Hospital, London, Dr. R. D. Thompson, F.R.S.	7.7
St. Mary's Hospital, London, W. Copney, Esq.	7.5
Enfield, Rev. J. M. Heath.	8.7
Great Berkhampstead, W. Squire, Esq.	10.2
Rose Hill, near Oxford, Rev. J. Slatter, F.R.A.S.	8.9
Bicester, (Oxon.,) W. Johnson, Esq., F.R.A.S.	7.3
Oxford Observatory, M. J. Johnson, Esq., F.R.A.S.	9.1
Hartwell House, near Aylesbury, Dr. Lee, F.R.S.	7.5
Hartwell Rectory, Rev. C. Lowndes, F.R.A.S.	7.4
Eign, near Hereford, H. Wheatley, Esq.	8.9
Knebworth, (Herts.,) C. B. N. Pearson, Esq.	8.9
Royston, (Herts.,) W. Wortham, Esq.	8.0
Cardington, (Beds,) S. C. Whitbread, Esq., F.R.S.	5.6
Lampeter, (Cardiganshire,) Rev. J. Matthews.	6.3
Worcester, J. Whitton, Esq.	7.6
Norwich, W. Brooke. Esq.. F.R.A.S.	5.7
Belvoir Castle, W. Ingram, Esq.	6.6
Grantham, J. W. Jeans, Esq., F.R.A.S.	5.8
Boston, T. Collis, Esq.	5.6
Derby, Mr. J. Davis.	6.5
Holkham, S. Shellabear, Esq.	6.4
Observatory, Beeston, the Editor.	5.0
Highfield House Observatory, do.	6.4
Hawarden, Dr. Moffat, F.R.A.S.	8.4
Gainsborough, T. Dyson, Esq.	6.4
Warrington, T. G. Rylands, Esq.	10.1
Liverpool Observatory, J. Hartnup, Esq., F.R.A.S.	8.6
Wakefield Prison, W. R. Milner, Esq.	6.1
Stonyhurst College, Rev. J. Clare.	9.9
York, J. Ford, Esq.	7.7
Scarborough, R. B. Cooke, Esq.	5.1
Isle of Man, J. Burman, Esq. F.R.A.S.	6.9
Observatory, Whitehaven, J. F. Miller, Esq., F.R.S.	9.0
North Shields, R. Spence, Esq.	8 4
West Austruther, D. Tennant, Esq.	5.7
Arbroath, A. Brown, Esq.	5.8
Elgin, Dr. Geddes.	6.6

The greatest number of rainy days occurred at Royston, Exeter, Lampeter, Wakefield, Whitehaven, Clifton, and Hartwell Rectory; and the least number at Ryde, Guernsey, Jersey, Newport, Greenwich, York, Ventnor, Teignmouth, London, Belvoir Castle, and Scarborough. The greatest amount fell at Great Berkhampstead, Warrington, Stoneyhurst, Oxford, Whitehaven, Rose Hill, Eign, and Knebworth, the average being 9.4 inches; the least amount occurred at Truro, Teignmouth, Scarborough, Jersey, Helston, and Falmouth, the average being 5.1 inches.

DIRECTION OF THE WIND,
AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN OCTOBER, 1855.

1ST.—NNE, 2h. 45m. a.m. gradually moved to SE, then to S and to SW, 3h. 30m. S, then SW and SSW till 3 p.m., when WSW, becoming W at 11h. 15m.

2nd.—W and WSW, 10h. 15m. a.m. NW, 10h. 45m. N, 11h. 15m. NW, 1 p.m. NNE.

3rd.—NNE, 3 a.m. NE and ENE, 4h. ESE, 5h. E, 3 p.m. ESE and SE, 6h. SSE, 9h. S, 10h. 45m. SW.

4th.—WSW, 2h. 5m. a.m. S, 2h. 15m. SSE and SE, 4h. 45m. S, 6h. to W and back through S to ESE, 7h. SW, 9h. 45m. S, 10h. to E, and back to S, 3 p.m. to W and back to SSE, 5h. SW, 5h. 45m. W, 6h. 45m. SW, 9h. WSW.

5th.—WSW and SW, 6 a.m. S, 10h. 30m. SW and WSW, 4 p.m. S.

6th.—S to SSE.

7th.—SSE and SE, 6 a.m. S, 7h. SW and SSW, 2h. 45m. p.m. S, 4h. 30m. SSE, 9h. 30m. through E to NNE, 11h. N, 11h. 45m. NNW.

8th.—NNW and NW, 3h. 15m. a.m. through W to SSW and back to WSW, 8h. 45m. SW, 1h. 30m. p.m. W, 6h. NNW.

9th.—From NNW through W to SSW and back to WNW, 1h. 15m. a.m. NW, 2h. W, 3h. SW, 4h. 30m. WSW, 9h. SW, 11h. 15m. W, 11h. 30m. NW, 6 p.m. N, 7h. NNE, 8h. NE, 10h. N, 11h. NW.

10th.—NW, 5h. 30m. p. m. W, 10h. 30m. WSW.

11th.—WSW and SW, 8 a.m. W, 7h. 45m. p.m. WNW, 11h. W.

12th.—W.

13th.—W, 6h. 30m. p.m. SW.

14th.—SSW, 2h. 30m. a.m. SE, 3h. 30m. S, 3h. 45m. SW, 11h. 30m. W, 1 p.m. WSW, 2h. SW, 4h. NW.

15th.—NW, 4 a.m. WNW, 5h. W, 10h. 30m. SSW, 11h. 45m. S, 1h. 45m. p.m. WSW, 2h. W, 3h. 15m. SSW, 4h. W, 4h. 15m. NW, 6h. 15m. W.

16th.—W, 6 a.m. WSW, 9h. SW, 2 p.m. W, 3h. 15m. SW, 5h. 15m. through W to N, 6 p.m. NNE.

17th.—NNE, 6h. 30m. a.m. NW, 1 p.m. NNE, 6h. 15m. NW.

18th.—NW, 12h. 30m. a.m. W, 2h. 30m. SW, 1 p.m. W.

19th.—W, 6h. 45m. a.m. SW, 3 p.m. WSW, 6h. SW.

20th.—SW and WSW, 7 a.m. W to SSW.

21st.—W to SW, 1 p.m. WSW, 2h. W, 4h. WNW, 6h. W.

22nd.—W, 2h. 15m. a.m. moved through S to E and back to W, 3h. 30m. to NNW, 3h. 35m. through W to S and back to SSW, 5h. through S to E, 5h. 30m. through N to NW, 6h. 15m. through N to E, 6h. 30m. S to SW, 7h. 15m. to E, and back through S to W, 9h. 15m. a.m. SW.

23rd.—SW, 2 p.m. W, 3h. NW, 10h. W,

24th.—SW, 5 a.m. WSW, 10h. 30m. W, 8 p.m. WSW.

25th.—WSW, 10 a.m. SW.

26th.—SW, 5h. 15m. a.m. W, 6h. 15m. SW, 8h. a.m. WSW.

27th.—WSW, 3 a.m. moved through W to NNW, and in five minutes through N to NE, 10h. E, 12h. 45m. p.m. ENE, 1h. NE, 2h. 45m. NNE.

28th.—NNE, 11 a.m. NE, noon ENE, 1h. 30m. p.m. NE, 2h. 55m. NNE.

29th.—NNE, 12h. 45m. p.m. N, 2h. 45m. NNE, 6h. NE.

30th.—NE, 1 a.m. NNE.

31st.—NNE.

FORCE OF THE WIND,
AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN OCTOBER, 1855.

1st.—3 to 4oz., 2 p.m. 2oz., 4h. 1oz.

2nd.—1oz., 11 a.m. calm.

3rd.—Calm, 9 a.m. 1oz., noon 2 to 4oz.

4th.—2oz., 10 a.m. 2 to 4oz., 11h. 4oz. to 1lb., noon 4oz. to 1lb. 5oz., 2 p.m. 1lb. 10oz., 3h. 3 to 4oz., 11h. 45m. 1lb.

5th.—4oz., 8 a.m. 1 to 3lb., noon 1lb. 7oz. to 1lb. 13oz., 5 p.m., 5 to 8oz.

6th.—3 to 4oz., 10 a.m. 9oz. to 2lb., noon 1lb. to 2¼lb., 5 p.m. 4oz., 6h. 8oz., 8h. 1lb. 5oz., 9h. 5 to 8oz.

7th.—4oz. to 1lb., 7h. 45m. a.m. 7oz. to 1lb. 9oz., 2 p.m. 4oz., 4h. 2oz., 6h. 1oz.

8th.—1oz.

9th.—1oz., 11 a.m. 4oz., noon 8oz., 1 p.m. 4oz., 3h. 1oz., 6h. 4 to 9oz., 9h. 1oz.

10th.—1oz., 8 a.m. 1lb. 6oz., 9h. 4oz., 10h. 1lb. 5oz. to 1lb. 9oz., 2 p.m. 1lb. 12oz., 5h. 4oz. to 1lb. 7oz., 9h. 5 to 8oz.

11th.—4 oz., 3 a.m. 7oz. to 1lb. 7oz., 4h. 5 to 9oz., 9h. 5oz. to 1lb. 6oz., 10h. 4 to 7oz., noon 1 to 3oz., 2 p.m. 7oz. to 1lb. 10oz., 4h. 7oz. to 1lb. 14oz., 5h. 8oz. to 2lb. 10oz., 6h. 8oz. to 3lb. 6oz., 7h. 8oz. to 1lb. 6oz., 8h. 5 to 8oz., 9h. 4oz.

12th.—4 to 11oz., 3 a.m. 3oz., 7h. 1oz.

13th.—1oz., 11 a.m. 8oz. to 1lb. 12oz., 3 p.m. calm.

14th.—Calm, 3 p.m. 1 to 3oz., 4h. calm.

15th.—Calm, 3h. 15m. p.m. 4oz., 4h. 30m. 1oz.

16th.—1oz., 10 a.m. 4oz., 2 p.m. calm.

17th.—Calm.

18th.—Calm, 8 a.m. 9oz., 10h. 4oz., 1 p.m. 4oz. to 1lb. 3oz., 3h. 4oz., 5h. 2oz. 10h. 1oz.

19th.—1oz., 8h. 30m. a.m. 4oz., 11h. 30m. 1lb. 6oz., 4 p.m. 3 to 4oz.

20th.—1 to 4oz., 8h. 30m. a.m. 4oz. to 1lb. 6oz., 1 p.m. 1lb. 10oz., 2h. 2lb., 3h. 1lb. 11oz., 4h. 8oz., 5h. 1lb. 10oz., 6h. 10oz., 7h. 1lb. 6oz., 11h. 7oz.

21st.—1lb. 5oz., 1h. 30m. a.m. 4oz., 6h. 1lb. 6oz., 7h. 9oz., 9h. 1lb. 6oz., 10h. 1lb. 12oz., 11h. 1lb. 6oz., 1 p.m. 1lb., 2h. 8oz., 3h. 1lb. 5oz., 4h. 4oz., 5h. 7oz., 6h. 3oz., 7h. 2oz., 8h. 1oz.

22nd.—1oz.

23rd.—1lb. 9oz., 6h. 30m. a.m. 1lb. 4oz., 10h. 50m. 2lb. 9oz., 2 p.m. 1lb. 13oz., 5h. 1lb. 7oz.

24th.—4oz.. 2 a.m. 1lb. 7oz., 5h. 4oz., 1h. 45m. p.m. 9oz., 3h. 45m. 1lb. 4oz., 4h. 45m. 1lb., 5h. 4oz., 9h. 1lb., 10h. 1lb. 14oz., 11h. 2lb. 14oz.

25th.—2lb. 14oz., 2h. 3lb. 3oz., 3h. 2lb. 10oz., 4h. 1lb. 9oz., 5h. 1lb. 14oz., 6h. 1lb. 4oz., 7h. 15m. 4oz., 10h. 3lb., 6 p.m. 1oz., 7h. 3lb., 8h. 30m. 4lb. 7oz., 8h. 45m. 2lb. 15oz., 9h. 30m. 3½lb.; 10h. 15m. 4lb. 3oz., 11h. 45m. 4lb. 10oz.

26th.—3lb. 10oz., 1 a.m. 2lb. 14oz., 2h. 15m. 3lb. 8oz., 3h. 30m. 4lb. 3oz., 4h. 45m. 5lb., 5h. 2lb. 14oz., 5h. 5m. 4lb., 5h. 15m. 2lb. 5oz., 5h. 45m. 4oz., noon 1oz.

27th.—1oz., 11 a.m. calm, 3 p.m. 4oz., 5h. 15m. 8oz., 5h. 30m. 4oz., 9h. 3oz.

28th.—3oz., 3 a.m. 4oz., 2 p.m. 1oz., 5h. calm.

29th.—Calm, 4h. 30m. p.m. 1oz., 6h. 15m. 4oz., 9h. 30m. 1lb. 7oz.

30th.—1lb. 8oz., 1 a.m. 10oz., 2h. 1lb. 6oz., 4h. 1lb. 12oz., 5h. 2lb., 6h. 2lb. 6oz., 7h. 1lb. 14oz., 8h. 15m. 3lb. 8oz., 2h. 30m. p.m. 4½lb., 3h. 3lb., 8h. 2½lb.

31st.—3½lb., 3 a.m. 4½lb., 7h. 3lb.

ELECTRICITY AT THE BEESTON OBSERVATORY, DURING OCTOBER, 1855.

Electricity positive, and rather feeble, except on 4th., when positive at 2h. 8m. and powerful; the gold leaf moving towards negative with every flash of lightning; after the storm ended the Electricity became negative. On the 13th., at 11 a.m., more Electricity, positive. 18th., positive, and rather stronger. 24th., 5 p.m., powerful and negative; at 5h. 30m. less powerful, became positive at 9 p.m.

On the 4th., at 5h. 45m. a.m., tremendous rain for an hour; from 1h. 45m. p.m., till 3 p.m., storm passed over in a SSW current, heavy rain, thirteen vivid flashes of lightning.

On the 26th., after a violent gale all night from SW, at 5h. 15m. a.m. the wind moved to W; the gale increased, rain and hail fell violently, with thunder and lightning; at 5h. 30m. a.m., storm over and the gale ended.

SCOTTISH METEOROLOGICAL ASSOCIATION.

This Association was formed on the 11th. of July, 1855, the Marquis of Tweeddale in the chair. The meeting elected the Duke of Argyll as President, the Marquis of Tweeddale as Vice-President, and A. Keith Johnston, Esq., as Honorary Secretary. On the council are Sir J. S. Forbes, Bart.; Sir W. Jardine, Bart.; Professors Anderson, Forbes, P. Smyth, Gray, Connell, Alison, Wilson, Traill, and Nichol; Robert Russell, Esq., W. Stephenson, Esq., C. M'Intosh, Esq., etc. Already upwards of a hundred members have been enrolled. Thus, another new Society has sprung into being, which will materially assist in labours that have been so well begun by the British Meteorological Society.

ROYAL ASTRONOMICAL SOCIETY.

No. 9, Vol. 15, of the "Monthly Notices."

This number contains observations on the second Comet of 1855, from the Liverpool Observatory, by J. Hartnup, Esq.; with calculations of the *elements*, by M. Bruhns; motion of Comet retrograde. Elements of the first Comet of 1855, by M. Winnecke; motion also retrograde. The announcement of the discovery of two new Planets—*Fides*, in AR 2° 12′ 21″, (at 8h. 44m. p.m., October 6th.;) N. Decl. + 0° 49′ 18″; *Atalante*, (9th.,) AR 22° 56′ 32″; Decl. 6½°. And certain anomalies in the binary star 70 *Ophiuchi*. by Captain W. S. Jacob.

STATE OF THE WEATHER IN OCTOBER, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY.

1st., fair, from noon till 1 p.m., rain. 2nd., fine, with shower at 5h. 40m. p. m. 3rd., fine. 4th., showers, evening fine. 5th., fine. 6th., rain commenced at 7h. 30m. a.m., and continued. 7th., fine, from 4h. 30m. p.m. till 11 p.m., thunder, lightning, and rain. 8th., fine, 11 a.m., thunder. 9th., fine. 10th., fine. 11th., fine, 9h. 50m. p.m., rain. 12th., fine. 13th., fine. 14th., fine. 15th., fine. 16th., fine. 17th., fine. 18th., fine. 19th., fair, from 8 p.m. rain. 20th., fine, 10 p.m. a shower. 21st., fine. 22nd., fine. 23rd., rain till noon, 9 p.m. a shower, frequent lightning. 24th., fine. 25th., cloudy, from 5 p.m. showers. 26th., fine. 27th., rain from 8h. 30m. a.m., till 10h. 15m. a.m., windy. 28th., fine. 29th., fine. 30th., fine. 31st., fine.

RESULT OF OBSERVATIONS MADE AT HIGHFIELD HOUSE OBSERVATORY, IN OCTOBER, 1855.

THERMOMETER.

Mean of October from 1809 to 1852, 50.0°; and from 1847 to 1854, 48.2°.
Mean of October from 1810 to 1820, 51.0°; and from 1820 to 1830, 50.4°.
Mean of October from 1830 to 1840, 50.2°; and from 1840 to 1850, 48.5°.
Diurnal range‘ 37.9°.

HYGROMETRICAL OBSERVATIONS.

Mean temperature of wet-bulb, corrected for diurnal range, 46.9°; mean temperature of evaporation 46.4°; mean temperature of the dew point, 44.5°; mean temperature of the dew point, between 1847 and 1854, for October, 44.3°; excess or defect of mean dew point in 1855, — 0.2°. Mean weight of vapour in a cubic foot of air, 3.6 grains; average between 1848 and 1854, 3.3 grains; excess or defect in 1855, — 0.3 of a grain. Additional weight of vapour required to saturate a cubic foot of air, 0.6 of a grain; average between 1848 and 1854, 0.7 of a grain; excess or defect in 1855, — 0.1 of a grain. Degree of humidity, (complete saturation being 1.000,) 0.858; average from 1848 to 1854, 0.850; excess or defect in 1855, + 008. Mean weight of a cubic foot of air 531.8 grains; average between 1848 and 1854, 537 grains; excess or defect in 1855, — 5 grains. Whole amount of water in a vertical column of the atmosphere, 4.3 inches; average of the last four years, 3.9 inches; excess or defect in 1855, — 0.4 of an inch.

OZONE.

Mean amount, 3.1; number of nights without ozone, 1; number of days without ozone, 16. Mean with W wind, 4.0; with NW wind, 2.4; N wind 3.6; NE wind, 1.0; E wind, 2.0; SE wind, 4.4; S wind, 3.2; with SW wind, 3.0.

BAROMETER.

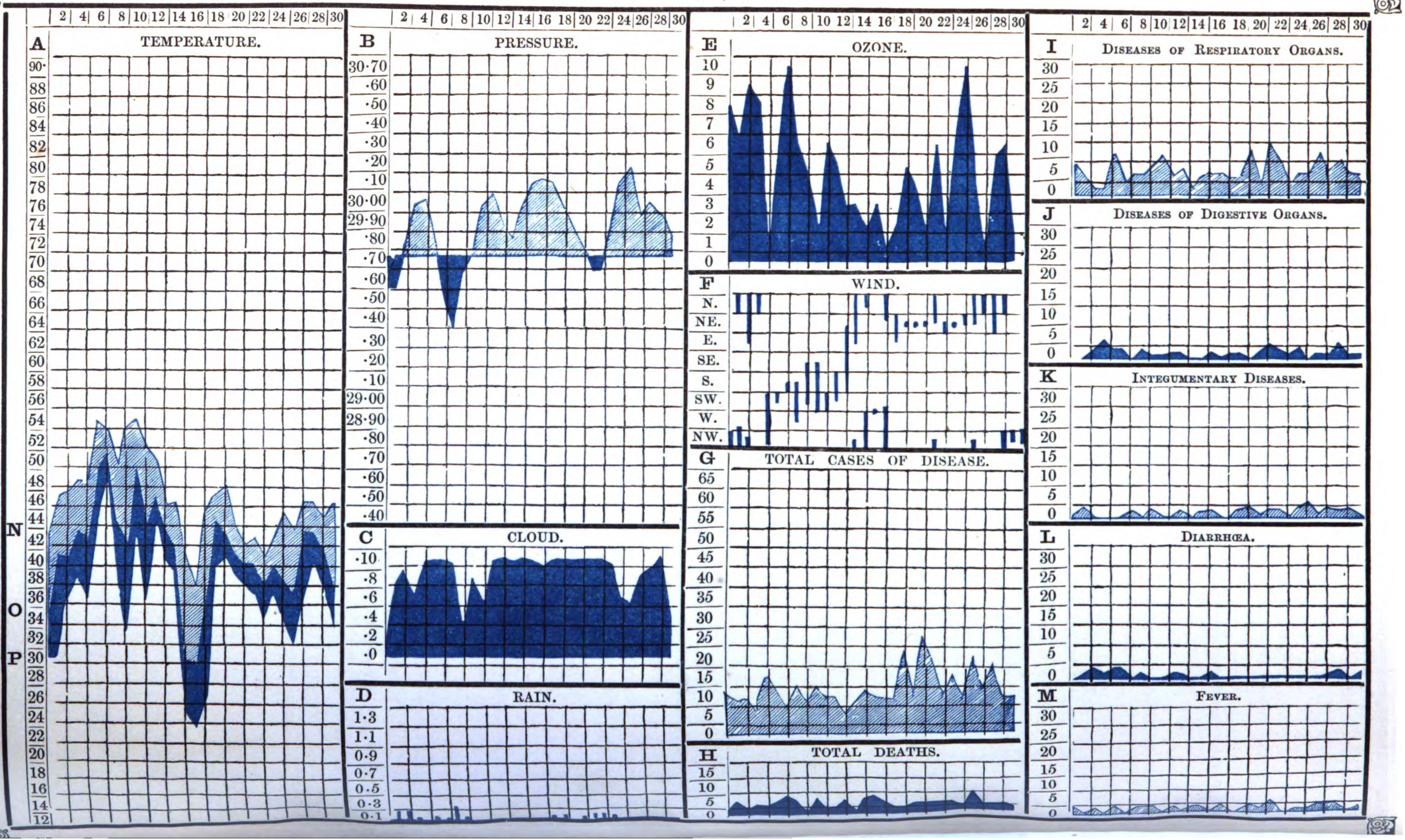
Barometer average from 1847 to 1854, 29.697 inches; excess or defect in 1855 from the mean, — 0.232 of an inch; range in October, 1855, 1.222 inches.

Thermometer, mean dry-bulb, (corrected for diurnal range,) 49.1°; mean of the greatest heat and greatest cold of each day, (corrected for diurnal range,) 48.1°; excess or defect of adopted mean in 1855 from that of the last eight years, + 0.4°; and of the last forty years, — 1.4°. Greatest heat in sunshine, 100.5°; greatest amount of solar radiation, 33.8°; of terrestrial radiation, 6.5°. Rain at two feet from the ground, 4.760 inches; average fall of rain for the past eleven years, 2.6 inches; excess or defect in 1855, + 2.2 inches; number of days on which rain fell, 22. Mean pressure of dry air, or that of the gases, 29.156 inches; elastic force of vapour, or mean pressure of the water contained in the air, 0.309 of an inch; average amount of evaporation from 1848 to 1854, 2.0 inches; excess or defect in 1855, — 0.4 of an inch.

METEOROLOGICAL TABLE FOR OCTOBER, 1855, FROM THE HIGHFIELD HOUSE OBSERVATORY, NOTTINGHAM.

Date.	Mean Pres. of Barom. (181 feet.)	Temperature of the Air.					Ozone.		Amount of Rain. at 25 feet.	Amount of Evap.	Temp. of Evap.
		Highest	Lowest.	Range.	Lwst on Grass.	Adptd. Mean.	In the night.	In the day.			
	In.	Deg.	Deg.	Deg.	Deg.	Deg.	0—10	0—10	In.	In.	Deg.
1	29.331	61.2	53.5	7.7	53.0	56.0	9	0	0.005	.082	53.7
2	.522	66.7	50.0	16.7	49.8	55.9	1	0	.004	.034	54.0
3	.438	58.4	48.8	9.6	42.5	55.4	2	0	.305	.052	54.1
4	.104	67.9	51.1	16.8	52.4	57.0	6½	4	1.045	.085	55.5
5	.119	59.9	48.0	11.9	44.9	54.4	7	1	.045	.080	50.7
6	.133	64.0	46.0	18.0	42.7	55.9	6	1	.004	.045	53.4
7	.145	61 4	47.8	13.6	51.8	53.3	8	7½	.400	.120	50.3
8	.349	61.8	38.9	22.9	37.2	48.9	1	0	.005	.050	47.4
9	.390	61.2	37.1	24.1	36.0	47.7	1½	5	.104	.046	46.4
10	.553	50.7	33.7	17.0	31.3	42.8	6	7½	.030	.039	39.2
11	.390	55.1	44.4	10.7	37.5	51.2	7	7½	.305	.063	49.2
12	.422	59.3	45.1	14.2	40.5	50.5	4	0		.020	48.0
13	.442	57.4	37.1	19.9	32.0	46.8	1	3		.028	43.4
14	.329	57.3	40.6	16.7	36.6	46.9	1½	5½		.058	44.3
15	.337	58.5	30.0	28.5	29.3	41.3	2	0	.205	.044	40.7
16	.567	55.2	32.1	23.1	30.0	42.4	3	0		.070	39.7
17	.695	49.8	41.8	8.0	34.8	45.4	1	0	.006	.046	43.2
18	.755	56.0	33.4	22.6	30.5	44.6	2	0	.005	.024	42.9
19	.904	58.7	42.2	16.5	36.1	49.2	5	5		.026	47.2
20	.932	59.8	44.1	15.7	38.8	53.3	1	0		.040	50.6
21	.907	62.1	49.8	12.3	52.1	55.0	8½	8½	.004	.068	52.9
22	.943	60 9	40.0	20.9	34.8	48.8	2	0	.003	.035	47.4
23	.676	62.6	42.5	20.1	39.5	51.5	2	0	.044	.042	49.5
24	.776	52.9	40.5	12.4	36.8	45.3	6	0	.005	.044	41.6
25	.409	54.0	36.8	17.2	33.9	48.5	1	6	.036	.077	45.5
26	28.921	55.0	38.8	16.2	46 5	46.1	8	0	.528	.074	44.3
27	29.385	50.0	38.8	11.2	32.5	43.6	1	6		.073	40.8
28	.647	48.8	36.2	12.6	33.6	40.9	8	6		.040	38.2
29	.304	45.7	30.0	15.7	26.0	40.0	1	0	.345	.032	39.0
30	.151	48.2	43.9	4.3	40.0	46 0	4	2	.745	.028	45.3
31	29.446	45.2	39.9	5.3	42.1	42.1	0	0	.278	.035	40.1
Mean	29.465	57.0	41.4	15.6	38.9	48.6	3.8	2.4	4.456	1.600	46.4
Max.	30.085	67.9	53.5	28.5	53.0	57.0	9	8½	1.045	0.120	55.5
Min.	28.863	45.2	30.0	4.3	26.0	40.0	0	0	0.003	0.020	38.2

NOVEMBER, 1855.



RESEARCHES ON
THE RELATION OF CLIMATE TO DISEASE.

BY TINDAL ROBERTSON, ESQ., M.D.

"THOSE governments that count their people do well; those that determine their duration of life and the causes of death do better; and those do the best of all which search out the obstacles that stand in the way of the most complete development of life, or impair its vigour, or prevent its maintenance, and endeavour to remove the cause of vital depression, which they may thus discover."

Thus writes an eloquent American author of the day; and in this strain, more or less, are speaking of the subject most of the thinking men of the present time. Simple enumeration of the numbers of a population gives us but a slight clue to the knowledge of its progression in strength. The political economist sees no small amount of difference in the proportion of good contributed to the common wealth by the infant and the octogenarian; and he seeks therefore, not only to register the number of those who exist, but how many are born, at what age they die, what their life is worth, and what amount of vigorous energy is enjoyed during its existence. Now this can only be accomplished by the careful and gradual collection of facts; these being afterwards collated and digested, and then generally diffused, will engender such knowledge of the laws of nature as may lead to the fullest conservation and enjoyment of existence.

In the earlier periods of life we are materially guided by our "instinct," to choose the healthful and avoid what is injurious; but as time advances and reason dawns, "instinct" fails more and more to exert an influence upon us; it is a "propensity," to use the words of a recent writer, "prior to experience, and independent of instruction," and its place must therefore be gradually assumed by the suggestions and experience of inductive science. To the growing appreciation of the truth of these principles we owe the progress of what the clear-sighted author of "Hypatia" calls "the great fact of the age." "What a yet unspoken poetry," says he, "is there in that very sanitary reform. It is the great fact of the age. We shall have men arise and write epics upon it when they have learnt that to the pure all things are pure, and that science and usefulness contain a divine element even in their lowest appliances."

The many branches of this formerly neglected but now diligently-cultivated subject, comprise, under their several heads, so much that is interesting, that I might well be pardoned for dwelling somewhat upon each; upon situation, physical and geographical, upon water-supply, drainage, ventilation, cultivation of mental and physical power, diet, regimen, etc.; but my present object is not so much to consider longevity as influenced by these causes, as to endeavour to establish the effects of climateric agencies upon disease.

No one who gives any consideration to the subject, when he remembers that the atmosphere is a heavy circumambient fluid, perpetually pressing upon us, so that a man of moderate stature, might be calculated to sustain from it a weight of about thirty-two thousand pounds, and when he knows from observation that the weight of the atmosphere is greater at one time than another, in the ratio of one-tenth of the mercurial column, no one, I say, who reflects on these facts, but will admit that this vast amount of pressure, continually deviating, must exert considerable influence on the animal economy. I do not here allude to the mechanical transmission by the atmosphere of particles of foreign objects, such as minute lichens, cryptogams, etc., though these have, no doubt occasionally, marked influence upon the system. I may, however, quote an interesting fact, mentioned by Dr. Prout, which places the influence of disturbance in the usual pressure very clearly before us.

"On the 9th. of February, 1832, the weight of the air suddenly appeared to rise above the usual standard. As the rise was, at the time, supposed to be the result of some accidental error, or of some derangement in the apparatus employed; in order to discover its cause, the succeeding observations were made with the most rigid scrutiny, but no error or derangement whatever could be detected. On the days immediately following, the weight of the air still continued above the standard. It retained its augmented weight during the whole time these experiments were carried on, namely, about six weeks longer. The increase of the weight of the air, observed in these experiments, was small; but still decided and real. About the 9th. of February the wind in London, which had previously been west, veered round to the east, and remained pretty steadily in that quarter till the end of the month. Now *precisely* on the occurrence of the changes here remarked, the first cases of epidemic cholera were reported in London, and from that time the disease continued to spread." If this is merely a coincidence, it is, to say the least of it, one of a very extraordinary character.

Take another instance of a similar kind. In the year 1782, and still more in the following year, a peculiar fog, or "haze," spread over a great part of Europe. Seen in mass it was pale blue. It was thickest at noon, when the sun appeared through it of a red colour. Rain did not in the least degree affect it. It is said to have possessed drying properties, and to have occasionally yielded a strong and peculiar odour. About the same time, there were in Calabria and in Iceland terrible earthquakes, accompanied by volcanic eruptions. These were generally supposed to have been connected with the "haze." The disperson of this "haze" in the summer of 1783, was attended by severe thunder-storms. During the above-mentioned years, 1782 and 1783, an epidemic catarrh, or influenza, prevailed throughout Europe: affecting not only mankind, but also other animals. It is stated by Torrella, in his "History of Italy," that in 1505, an epidemic catarrh prevailed throughout Italy and Spain. "Qui paucis peperit, senibus maxime, cum macedine, gravedine, molestâ tussi, *aëre valde turbato*."

(To be continued.)

THE WONDERS OF THE ATMOSPHERE.
A POPULAR TREATISE ON METEOROLOGY.

BY EDWARD JOSEPH LOWE, ESQ., F. R. A. S., ETC.

(Continued from page 106.*)*

Atmospheric tides are shewn to exist, and are pointed out to us by the oscillations of the barometer. Like as with the ocean there are two in every twenty-four hours, not caused, however, by gravitation, similar to those of the sea, but produced by the heat of the sun, and, consequently, purely *solar tides*. Their ebb and flow causes the barometer to be highest at nine o'clock in the morning, and lowest at three o'clock in the afternoon, and these effects are said to be produced by the sun's position in the heavens; the pressure being greatest when that luminary is three hours east, and least when three hours west of the meridian. These oscillations of the barometer are most sensibly felt at the equator, where the variation in pressure exceeds, on an average, the tenth of an inch of mercury; its rate of diminution, in alteration, is greater as we approach either pole. At latitude 30° the oscillation diminishes to one twentieth of an inch. In England, the sudden great barometric changes, in combination with the very small variation produced by the solar tide on the mean reading of the barometer, prevents its being noticed, yet, although unperceived by many, it still flows on.

If the height of the barometer were recorded five or six times during every day, for a period of a month, and the mean of the whole number of each of these hourly observations taken, it would be found, even in England, that the mean reading of nine o'clock in the morning will be greater than any other, whilst that at three o'clock in the afternoon will be the least. During the winter months this tide is not so readily shewn here, owing to the many fluctuations in those months, so that in winter a long series of observations are required, in order to neutralize these disturbances. These tides do not extend beyond the entrance of the polar seas. The solar tide is greatest at the level of the sea; high up in the air there is a second, called the *diurnal tide*, and this may be found on high hills or mountains, where the summits or ridges are in confined narrow bounds. This peculiar construction causes a current of air to flow from off the hills during the night, and a counter one towards the hills in the day-time.

A third tide produced by the moon is caused by lunar gravitation, but is only noticeable on mountains; the effect produced is a rise in the barometer to some little extent, when the moon is near the meridian. So that the difference in the pressure of the base and summit of a hill, when the moon is southing, is less than when she is at a considerable distance from the meridian.

This highly elastic and invisible air, of which we should be unconscious, were it not revealed to us by the barometer, light as it appears to us, is exerting a pressure upon an ordinary sized person, with a weight of about

14 tons, of course with a greater weight on a larger individual, and with a less weight on a smaller one, and constantly varying with the height of the barometer. Now, as the barometer differs in its height to an extent, so as to produce a difference of weight pressed upon us exceeding 2500 pounds, the effect occasioned is this:—when a pressure, equal to 2500 pounds, is removed from us we feel gloomy and ill, but the more this weight is increased, the more cheerful and buoyant do we become. Were this enormous pressure exerted in one direction, instead of on every side, we should be crushed to death; or did we not possess within our bodies the elastic spring of the air, (which is diffused throughout us,) reacting with a force exactly equal to the outward pressure of the air, we should in this case likewise be unable to struggle against it. It has been estimated that the weight of the atmosphere which encircles the whole earth, is five thousand billion tons, an amount equal to a solid ball of lead, of one hundred and ninety miles in circumference. Mrs. Somerville says the pressure of the atmosphere on the earth is 11,449,000,000 hundreds of millions of pounds weight.

In very many instances the pressure of the air is the chief cause why water in certain wells ceases to flow in frosty weather; many suppose the water itself to be frozen, and thus account for the phenomenon, this, however, is not always the case, for frequently the water itself is not frozen, as generally supposed; the surface of the earth being made impervious to atmospheric pressure by the firmly frozen ground, the atmospheric weight upon it being suspended for the time, the water is made to hang in its capillary tubes.

Returning to the elasticity or springiness of the atmosphere, we may inquire what experiments have been made regarding this branch of inquiry? The air has been pressed into a space eight hundred times less than it usually occupies, and it has also been spread over thirteen thousand six hundred and seventy-nine times the space it originally filled. A very familiar experiment will at once prove the elastic power of the air. Fill an india-rubber ball or cushion with common air, and secure the orifice, press your hand upon it, and you will make it occupy less space, on removing the hand, the depression produced will instantly be filled up again. The elastic force of the air is never lessened. Our celebrated experimenter in philosophy, Mr. Boyle, tried how long air would be before it parted with its elasticity, but, in all his numerous experiments, he never found any diminution. An air-gun was kept loaded sixteen years, by Mr. Roberval, and it went off with an equal force to what it had done sixteen years before, when only just loaded, or rather condensed.

When we alluded just now to the probable height of the atmosphere, it was a cursory glance, and when we said that the probable height was about fifty miles, yet there may be a rarefied air, *an almost nothing,* extending far beyond this. If we rise four miles above the earth, we have passed through more than one half of the atmosphere. Gay Lussac, in 1804, ascended in his balloon until he had reached an elevation of twenty-three thousand feet, and the barometer recorded a pressure of thirteen inches. At the summit of the Andes, (twenty-eight thousand feet above the level of the sea,) the barometer is only eleven inches and a half, and our loftiest clouds, the fibrous cirri, float in a medium which is only dense enough to counterpoise ten inches of mercury, therefore these clouds are drifted along in an atmosphere which is two-thirds less dense than that we enjoy. Our atmosphere revolves with the earth on its axis, as well as accompanying her in the annual revolution round the sun; and as our globe at the equator turns at the rate of one thousand miles an hour, and as the higher we ascend in the air, the greater will be the circumference of the circle in which the air has to move; consequently, for the same law to be obeyed in the higher regions of the air, the more removed it is from the earth the greater will be its speed, and we may thus suppose a constant and rapid increase in speed and thinness, as we proceed upwards. This increase in speed and pureness continuing greater and greater, until a spot is arrived at where the extreme lightness (if we may call such a rareness of air by so heavy an appellation) of our atmosphere and that of the resisting medium in space are equal; at this particular zone there should be rest, and beyond which, a gas as much lighter than air at the earth's surface, as common air is lighter than the metals, and this gas moving in the opposite direction.

(To be continued.)

THERMOMETRICAL OBSERVATIONS MADE BY THE LATE MATTHEW NEEDHAM, ESQ., AT LENTON GROVE, (A DISTANCE OF ABOUT 200 YARDS N.W. OF THE HIGHFIELD HOUSE OBSERVATORY.)

TEMPERATURE OF JANUARY, BETWEEN 1810 AND 1840.

(Continued from page 117.*)*

1824.—MEAN temperature at 8 a.m., 38°; and at 11 p.m., 39.4°; adopted mean, 39.8°. At 8 a.m., between 35° and 45° to 11th., except on 8th., when 31°, and on 10th. 47°; from 12th. to 17th., between 26° and 35°; between 18th. and 31st., ranged between 35° and 45°, except on 25th., when 49°; and 26th., when 52°; and on 30th., when 26°. At 11 p.m., between 34° and 44°, except on 2nd., 45°; 11th., 32°; 13th., 31°; 15th. and 16th., 32°; 22nd. and 24th., 47°; 25th., 50°; and 26th., 46°. At 8 a.m., frosts on six days, and at 11 p.m., frosts on four nights.

1825.—Mean at 8 a.m., 37.9°; and at 11 p.m., 38.4°; adopted mean 39.2°. At 8 a.m. was on the 1st. 50°, 2nd. 44°, 3rd. 38°, 4th. 51°, 5th. 34°, 6th. 28°, 7th. 42°, then to 16th. between 35° and 42°, except on 12th., when 27°, 17th. 32°, 18th. 46°, 19th. 33°; then between 34° and 41°, except on 24th. 31°, 26th. 30°, 27th. 48°, 29th. 30°, and 31st. 46°. At 11 p.m., on 1st. 54°, 2nd. and 3rd. 40°, 4th. 33°, 5th. 32°; then to 24th.

between 34° and 41°, except on 7th. 43°, 11th. and 12th. 32°, 23rd. 33°, and 25th. 30°; then to end between 41° and 48°, except on 28th. when 32°. There were six frosts at 8 a.m., and five at 11 p.m.

1826.—Mean at 8 a.m., 29.8°; and at 11 p.m., 32.1°; adopted mean 32.0°. At 8 a.m. to 7th. between 33° and 39°, except on 3rd. 32°, on 8th. 31°, 9th. 26°, 10th. 15°, 11th. 30°, 12th. 23°, 13th. 15°, 14th. 13°, 15th. 11°, 16th. 15°, 17th. 28°, 18th. 32°, then to 23rd. between 34° and 40°, 24th. 24°, 25th. to 29th. between 30° and 33°, 30th. 40°, 31st. 44°. At 11 p.m., 1st. 42°, then to 7th. between 33° and 37°, then to 16th. between 19° and 30°, except on 14th. 14°, 15th. to 17th., from 25° to 32°, 18th. to 20th. from 38° to 40°, 21st. to 28th. 29° to 35°, 29th. 37°, 30th. 40°, 31st. 46°. There were seventeen frosts at 8 a.m., and fifteen at 11 p.m.

1827.—Mean at 8 a.m., 33.6°; and at 11 p.m., 33.8°; adopted mean, 34.8°. At 8 a.m., 4th. 13°, 3rd. 18°, 25th. 19°, 8th. 51°, 14th. 50°. At 11 p.m., on 3rd. 9°, 25th. 13°, 24th. 18°, 8th. 52°. Warm on 1st., 7th. to 10th., 13th. 14th. 16th. and 29th. to 31st.; cold on 2nd. to 5th., and 19th. to 27th. There were sixteen frosts at 8 a.m., and fourteen at 11 p.m.

1828.—Mean at 8 a.m., 39.0°; and at 11 p.m., 40.0°; adopted mean, 40.6°. There were at 8 a.m. six frosts, and at 11 p.m., three. On 10th., temperature 20° at 8 a.m., and 21° at 11 p.m.; and the 11th. 24° at 8 a.m.; 51° at 8 a.m. on 19th., and 11 p.m. 2nd.; 52° at 11 p.m. on 19th., 50° at 8 a.m. on 18th., 22nd., and 25th., and at 11 p.m. on 18th. and 24th. Warm on 1st. to 3rd., and 18th. to end of month.

1829.—Mean at 8 a.m., 31.1°; at 11 p,m., 31.4°; adopted mean, 32.7° At 8 a.m. on 19th. 18°, 20th. and 22nd. 19°, 25th. 20°; at 11 p.m., 20° on 24th.; at 8 a.m. 45° on 1st. and 4th.; and at 11 p.m. 41° on 1st. There were fourteen frosts at 8 a.m., and fourteen at 11 p.m. Warm on 1st. and 4th., cold on 16th. to 26th.

1830.—Mean at 8 a.m., 30.7°; and at 11 p.m., 31.4°; adopted mean, 32.1°. At 8 a.m. was 10° on 19th., 14° on 18th., 23° on 26th. and 31st., and 42° on 7th. At 11 p.m., 14° on 18th., 21° on 31st., and 42° on 6th. There were sixteen frosts at 8 a.m., and fourteen at 11 p.m. Weather only warm on one day; cold from 17th. to 20th., 26th. and 31st.

1831.—Mean at 8 a.m., 34.1°; and at 11 p.m., 35.6°; adopted mean, 35.9°. At 8 a.m., 24° on 7th., 26° on 26th., and 45° on 19th.; at 11 p.m., 25° on 25th., and 44° on 19th. There were ten frosts at 8 a.m., and ten at 11 p.m. Cold on 7th. and 8th., and 25th. to end; warm on 2nd., and 18th. to 22nd.

1832.—Mean at 8 a.m., 35.7°; and at 11 p.m. 37.1°; adopted mean 37.5°. There were four frosts at 8 a.m., and seven at 11 p.m. At 8 a.m., temperature between 33° and 36° to 3rd., on 4th. 23°, 5th. 29°, 6th. 31°, then to 17th. from 37° to 43°, except on 14th. when 33°, and 16th. 32°, from 18th. to 20th. 31°, from 21st. to 25th. from 35° to 44°, from 26th. to 28th. 28° to 33°, and to end from 35° to 42°. At 11 p.m. 1st. 29°, then to 5th. between 30° and 34°, then to 17th. from 35° to 42°, 18th. and 19th. 31°, 19th. to 24th. from 37° to 44°, then 34° to 42°, except on 27th., when 30°.

1833.—Mean at 8 a.m., 33.3°; at 11 p.m., 34.5°; adopted mean, 35.0°. There were at 8 a.m. ten frosts, and at 11 p.m., thirteen. At 8 a.m., to the 12th. between 27° and 33°, except on 2nd. 43°, 4th. and 9th. 35°, on 10th. 30°, 11th. 28°, from 12th. to 20th., from 33° to 38°, 21st. 28°, 22nd. 26°, 23rd, 33°, 24th. 22°, 25th. 30°, 26th. to 30th. from 34° to 40°, and 31st. 27°. At 11 p.m., on 1st. 49°, then to 6th. from 27° to 32°, except on 3rd. 38°, 7th. 37°, 8th. 35°, then to 11th. from 27° to 33°, from 12th. to 20th. from 33° to 39°, from 21st. to 25th. from 27° to 32°, from 26th. to 29th. from 36° to 41°, 30th. and 31st. 32°.

1834.—Mean at 8 a.m., 43.9°; at 11 p.m., 44.2°; adopted mean, 45.1°. At 8 a.m. only one frost, and at 11 p.m., only one. At 8 a.m., 1st. 39°, 2nd. 36°, 3rd. to 16th. from 40° to 48°, except on 7th. 37°; 17th. 51°; to 20th., from 35° to 43°, 21st. 49°, 22nd. and 23rd. 52°, 24th. 53°, 25th. to 27th. 43° to 50°, 28th. 52°, 29th. 31°, 30th. 36°, 31st. 44°. At 11 p.m., to 20th. from 40° to 48°, except on 2nd. 33°, 3rd. 51°, and 19th. 37°, then to 27th. from 45° to 50°, except on 23rd. 55°, 25th. 42°, 28th. 40°, 29th. 32°, 30th. 44°, 31st. 43°.

1835.—Mean at 8 a.m., 35.2°; and at 11 p.m., 35.9°; adopted mean, 36.6°. There were ten frosts at 8 a.m., and ten at 11 p.m. Temperature at 8 a.m. 16° on 21st., 19° on 4th., 21° on 3rd., 22° on 18th., 25° on 8th., 49° on 16th., and 48° on 25th. and 26th. At 11 p.m., on 3rd. 23°, and 26° on the 4th., 17th., and 20th., and 47° on 15th. Warm on 1st., 12th. to 16th., and 23rd. to end; coldest 2nd. to 4th., and 17th. to 21st.

1836.—Mean at 8 a.m., 37°; and at 11 p.m., 38.2°; adopted mean, 38.7°. There were eight frosts at 8 a.m., and eight at 11 p.m. At 8 a.m., temperature 24° on 2nd., 26° on 12th., 53° on 23rd., 48° on 5th., and 47° on 4th. At 11 p.m., was 26° on 1st., 28° on 11th., 48° on 4th. and 5th., and 46° on 3rd. Warm on 3rd. to 8th., 13th. to 15th., 18th., and 20th. to 28th.

1837.—Mean at 8 a.m., 37.5°; and at 11 p.m., 37.0°; adopted mean, 38.3°. There were six frosts at 8 a.m., and six at 11 p.m. At 8 a.m., 23° on 2nd., 47° on 9th., 10th., and 13th., 27° on 11th., and 57° on 14th. At 11 p.m., 23° on 1st., 47° on 9th., 27° on 11th., 48° on 22nd. and 23rd. Warm on the 6th., 9th., 10th., 13th., 14th., 17th. to 19th., 21st. to 27th., and 31st.

1838.—Mean at 8 a.m., 28.6°; and at 11 p.m., 27.8°; adopted mean, 29.3°. There were twenty-two frosts at 8 a.m., and twenty-four at 11 p.m. Temperature at 8 a.m., 42° on 1st., 34° to 39° to 5th., 28° to 30° to 10th., 26° on 11th. and 12th., 27° on 13th., 23° on 14th., 8° on 15th., 22° on 16th., 27° on 17th., 26° on 18th., 20° on 19th., 17° on 20th., 20° on 21st., 37° on 22nd., 34° on 23rd., from 27° to 29° to 27th., from 31° to 36° to end. At 11 p.m., 9° on 20th., 12° on 14th. and 19th., 20° on 15th., 21° on 18th., 23° on 13th., and 25° on 11th., 16th., and 26th.; was 43° on 2nd. Warm to 3rd., then cold; coldest from 11th. to 21st., and from 24th. to 27th.

1839.—Mean at 8 a.m., 34.9°; and at 11 p.m., 35.9°; adopted mean, 36.5°. There were at 8 a.m. twelve frosts, and at 11 p.m. eight. Temperature at 8 a.m., 22° on 30th., 23° on 18th., 24° on 10th., and 27° on 9th. and 17th.; was 46° on 11th., and 49° on 13th. At 11 p.m., 24° on 9th., 27° on 29th. and 30th., and 50° on 11th. The weather warm till 4th., from 6th. to 7th., from 10th. to 14th., 19th. to 21st., and on the 25th.

1840.—Mean at 8 a.m., 38.1°; and at 11 p.m., 38.6°; adopted mean, 39.4°. There were eight frosts at 8 a.m., and six at 11 p.m. At 8 a.m., temperature on 7th. 24°, 24th. 53°. At 11 p.m. 25° on 6th., 26° on 7th., 53° on 23rd., and 50° on 1st. Warm to 4th., and from 14th to 26th.

I have preferred using the adopted mean from the observations at 8 a.m. and 11 p.m., to those for the two sets of hourly and self-registering records, from the circumstance, that after applying the correction for diurnal range, the 8 a.m. observations so nearly agree with those made at 11 p.m. as to shew that great care has been taken with them; and furthermore, the instrument used is now in my possession, and on comparing it with my standard, is shewn to be correct within a tenth of a degree. On the other hand, I do not know anything about the self-registering instruments, and when corrected for diurnal range, the readings do not agree close enough with those of the 8 a.m. and 11 p.m. observations.

The mean temperature for January, from 1810 to 1819, is 35.5°.
The mean temperature for January, from 1820 to 1829, is 36.1°.
The mean temperature for January, from 1830 to 1840, is 36.8°.
The mean temperature for January, from 1830 to 1839, is 36.5°.
The mean temperature for January, from 1810 to 1840, is 36.1°.

The coldest January was 1814, and the hottest January, 1834. The years below the mean are 1810, 1811, 1813, 1814, 1815, 1820, 1823, 1826, 1827, 1829, 1830, 1831, 1833, and 1838; the coldest being 1814, 1838, 1820, 1823, and 1815; and the warmest 1834, 1822, 1828, 1824, 1818, 1817, 1840, 1825, and 1819. The difference between the mean temperature of the hottest and coldest January from 1810 to 1840 is 18.3°.

(To be continued.)

CLIMATE, WEATHER, AND DISEASE.

BY ALFRED HAVILAND, ESQ.

The auther has endeavoured to prove the dependence of a number of diseases, both for their origin and their continuance on certain climatic phenomena, in doing which a vast amount of interesting and valuable information has been placed before the reader. The opinions both of medical men of the present day, and of the earliest writers on the subject, occupy a portion of the pages of this work. There are four instructive maps at the close of the book, the first shewing the mean weekly average from 1844 to 1853, of the cases in London of Phthisis, Bronchitis, and Pneumonia, together with the mean weekly temperature; in the second map the same diseases are recorded for the year 1854; the third traces the weekly average of the cases of Small-pox, Measles, Scarlatina, and Typhus, from 1844 to 1853, with a comparison of the cases in 1854; the fourth is exceedingly interesting, being the weekly return of the mortality for 1849 and 1854 of Diarrhœa and Cholera in London, which it will be recollected were the two years rendered memorable from the sad ravages which were made. In a short time it is hoped that space will allow of something more than a brief notice of Mr. Haviland's excellent work.

SNOW CRYSTALS.

BY THE EDITOR.

(Continued from page 61,*)*

A very interesting paper upon this subject was read, by Dr. Lee, at the last meeting of the British Association; and this paper was accompanied by a series of beautiful photographs of Crystals, sketched by Mrs. Glaisher.

Aristotle is thought to have been the first to notice Snow Crystals, and the next observer appears to have been Des Cartes, and after him Kepler, Grew, and Dr. Scoresby; and latterly Sir Edward Belcher, Mrs. Glaisher, and one or two others.

Dr. Lee remarks that the labours of observers in England have proved that we have as many, and as complex varieties of Crystals as are found in the Arctic regions. The main difference consists in their size; in England they do not exceed 0.5 inch in diameter, whilst in the north seas the radii are frequently an inch in length. The subject is one of great interest, and apart from its scientific importance, might prove exceedingly useful to the lace designer, and to other manufacturers of fancy goods.

METEORS, OR FALLING STARS.

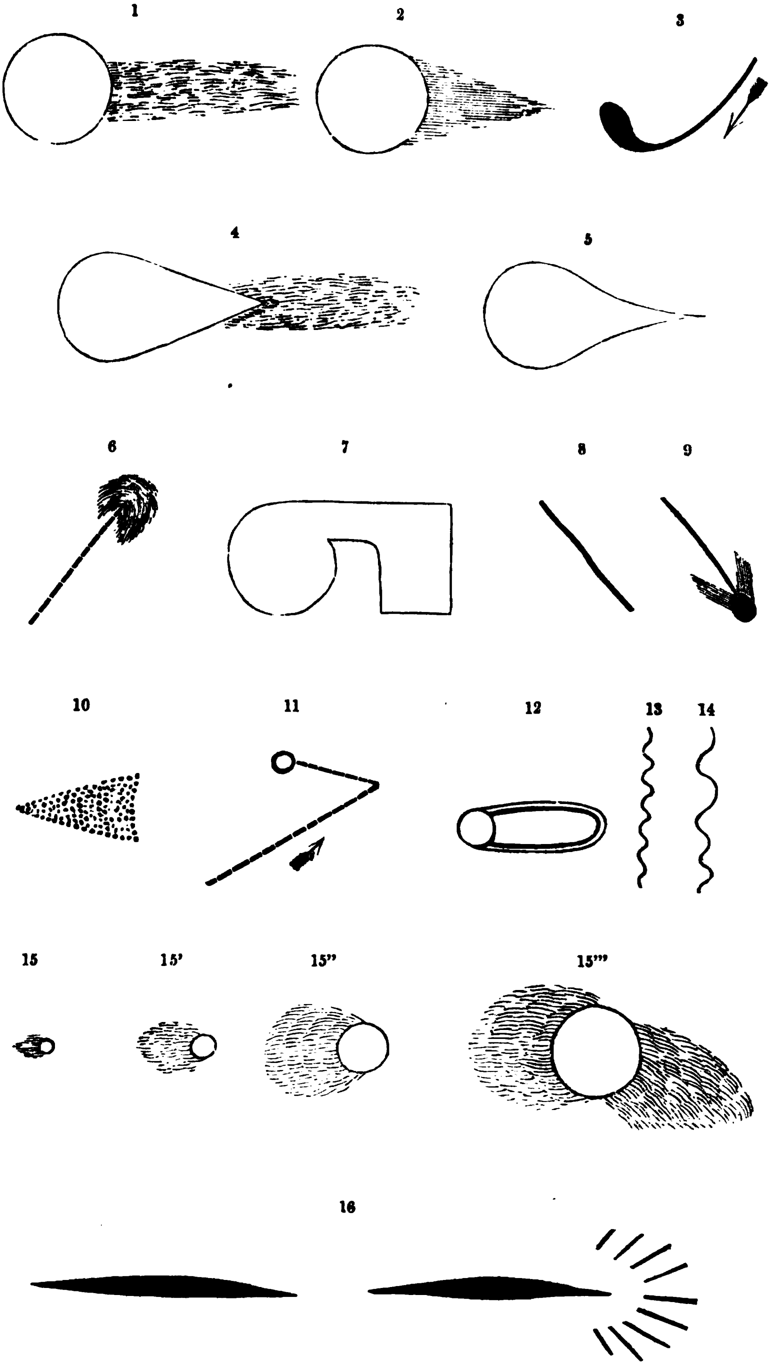
BY THE EDITOR.

(Continued from page 65.*)*

On the 10th. of November, 1843, in Austria, Mr. G. T. Vigne, at 5 p.m., heard a loud report, and then saw a perfectly white cloud, or mist, evidently the result of the explosion. On the 7th. of September, 1845, Mr. J. R. Hind noticed one change colour. On the 21st. of March, 1846, a large Meteor was seen, which M. Pettit calculated, and inferred to be a satellite to the earth; as also another on July 23rd., 1846, whose path was calculated by M. Pettit.

June 18th., 1845, 9h. 30m. p.m., an overpowering heat and stench of sulphur, and three luminous bodies issued from the sea, and remained visible ten minutes; at half an hour past sunset, on Mount Lebanon, a Meteor was

CURIOUS METEORS.



seen composed of two bodies, apparently each five times as large as the moon, with streamers from each joining the two; they remained visible for an hour. On the 3rd. of June, 1846, a Meteor at Moreton Bay, like the moon in form and size, burst with a loud explosion.

Figure 1 in the engraving, was observed at Highfield House, on 31st. of January, 1845, and Fig. 2 on the 18th. of February, 1843; they were about three times the apparent size of Jupiter. On the 3rd. of December, 1845, a globular Meteor burst over Mentz, at only a height of one hundred and fifty feet; it was followed by an immense quantity of black smoke. In 1845, April 24th., a Meteor as large as the moon was seen at Highfield House, circular, and with no appendages.

Fig. 3 occurred at Highfield House, on October 15th., 1850. Fig. 4 at the same place, on 8th. of August, 1849. Fig. 5 on the 8th. of March, 1848. Fig. 6, June 20th., 1851. Fig. 7, seen in India, in 1838. Fig. 8, October 20th., 1849. Fig. 9, a later appearance of Fig. 8. Fig. 10, August 29th., 1850. Fig. 11, August 29th., 1850. Fig. 12, February 12th., 1850, very large Meteor. Fig. 13, on November 5th., 1849; a Meteor fell, leaving a straight pencil of light 50° in length, which gradually assumed the appearance in the sketch, and afterwards the waves larger, as in Fig. 14. Fig. 15, 15′15″15‴, February 12th., 1850. Fig. 16, on 29th. August, 1850. Fig. 3 represents a Meteor which had a curved path. Fig. 6, somewhat like a mop. Fig. 7, a large and very remarkable Meteor, which was visible for a long time. Fig. 11 shews a Meteor which changed the direction of its path. Fig. 16 increased in size, then diminished and vanished, reappeared, increased in size, diminished and burst into rays.

CURIOUS SPRINGS AND WELLS.

(*Continued from page* 88.)

In the passage of water through the different strata of the earth, this fluid dissolves and carries with it the soluble matter which happens to be in its course; if the passage is through limestone, the carbonic acid of the water dissolves the lime, and produces carbonate of lime; and in the same manner sulphate of lime, of soda, iron, magnesia, etc., are produced. The temperature of the water is that of the temperature of the earth through which a spring passes, for water will become heated or cooled according as it rises up from a considerable depth, or falls from a hill or mountain. The temperature, however, makes but little difference to the mineral properties of the water. Much carbonic acid is in the Carlsbad Sprudel, temperature 167°; Nauheim, with temperature 86°; Fachingen, temperature 50°; and Schwalbach, temperature 50°. Carbonic acid and carbonate of iron, (called Chalybeates,) at Pyrmont, Langenschwalbach, Rohitsch, and Spa. The following springs containing sulphur are at a temperature of 111° to 135°, at Aix la Chapella; of 171° at Burtscheid, near Aix la Chapella; 127° at Mehadia, in Hungary; 50° at Nenndorf, and at Bentheim. Containing salt, 158° at Wiesbaden, and 153° at Baden Baden. Containing sulphate of soda, temperature 167° at Sprudel of Carlsbad; 115° at Bath; 113° at Lavey; 106° at St. Gervais, in Savoy; and 54° at Marienbad, in Bohemia. Containing chiefly carbonate of soda, temperature 189° at Aignes Chaudes, France; 113° at Vichy; 121° at Töplitz, Bohemia; 133° at Ems; 88° at Schlangenbad; 52° at Geilnau; and 50° at Fachingen.

Water at the surface cannot be heated above 212°; at thirty-four feet deep, not up above 250°; and at ten thousand feet, not beyond 667°.

EFFECT OF TEMPERATURE ON THE WHEAT CROP.

From the following table it will at once be seen that with a hot spring and summer we are sure of a good wheat harvest, on the contrary, if the weather be cold, the yield will prove deficient:—

In 1789, with a spring 2½°, and a summer 2° below the average temperature, very bad crop. In 1795, spring 1¼°, and summer 2¼° colder than usual, also very bad crop. In 1816, spring 2¾°, and summer 4¾° colder than usual, very bad. In 1779, spring 4¼°, and summer 2¼° above the average, very good crop. In 1826 spring 1°, and summer 4°; and in 1834, spring ½°, and summer 2½° above average, both years very good crops. The crop was good in 1775, spring 1¾° and summer 1¼° warmer than usual. In 1822, spring 3½°, and summer 2¼° warmer. In 1825, spring ½°, and summer 2° warmer; and in 1835, spring ¼°, and summer 2½° warmer than the average. The crop was bad in 1792, spring 1¼°, and summer, 1½° colder. In 1799, spring 3¾°, and summer 2¼° colder. In 1809, spring ¼°, and summer 1¼° colder. In 1810, spring ½°, and summer 3¾° colder. In 1812, spring 2¾° and summer 3¾° colder than usual. The crop was an average one in 1818, with spring ¼° colder, and summer 4¼° warmer than usual. In 1836, with spring and summer ¼°, warmer than usual. There was not an average in 1811, with spring 2¼° warmer, and summer 1¾° colder than usual.

THE EARTHQUAKES BETWEEN 1852 AND 1855.

(Continued from page 67.)

1852. November 27th., 7h. 30m. a.m., shock at Banda.
, , December 21st., a severe shock. Lat. 9° 48′ S, Lon. 104° 15′ E.
1853. February 10th., a severe shock at Belize, (Honduras.)
, , February 18th., 4 o'clock, a shock at Strathglass and Letterewe, Scotland.
, , February 26th., 2h. 30m. p.m., slight shock at Inverness; at 3 p. m. at Culloden.
, , March 6th. 1 a.m., Bath and Reading slight shock.

1853. March 21st., Bath, slight shock at 10 p.m.

, , March 27th., Crickhowell, 11h. 30m. p.m., slight shock. Also at Brecon and near Abergavenny, (most violent under the Sugarloaf hills,) Hereford, along the banks of the Wye and Usk, Byford, Staunton-on-Wye, Sarnesfield, Tiberton, Madley, Blakemere, Moccas, Bredwerdine, Dorstone, Michaelchurch, Craswell, Turnastone, Peterchurch, Vowchurch, Ewyas Harold, throughout the Golden Valley, Abbeydore, Kenderchurch, Kentchurch, Gresmont, Llanfihangel, Crucorney, Longtown, Ross, Monmouth. Bells rang, etc.

, , March 31st., 11 p.m., slight at Clifton.

, , April 1st., 5 a.m., along S end of Mendip Hills, Somersetshire, and on Cheddar.

, , April 2nd., 11 p.m., Isle of Wight, severe at St. Servan France, Jersey, Guernsey, Sussex, Hants, Dorset. In France, at St. Malo, Granville, Nantes, and most towns in Normandy and Brittany, Caen, Falaise, St. Lo, Alençon, Reunes, St. Brieux.

, , May 2nd., dreadful earthquake, destroyed the cities of Chiraz and Kashan, in Persia; upwards of fifteen thousand persons buried in the ruins. Three or four shocks a day up to the 14th.

, , July 15th., the city of Cumana totally destroyed by an earthquake, one thousand persons killed.

, , July 17th., shocks from 5 to 6 a.m., at Portland, United States.

, , August 11th., shock in latitude 17° N, longitude 26° W.

, , August 18th., Thebes destroyed by an earthquake. Severe at Athens and Attica.

, , September 20th., 5h. 50m. p.m., severe shock at Hobart Town, Van Diemen's Land.

, , November 4th., severe at Lisbon.

, , December 13th., violent in Spain.

1854. January 13th., from 2 to 3 a.m., terrible shock in Spain, at Finana.

, , January 13th., violent in Almeria.

, , February 8th., West Indies, very violent at Tortola, St. Kitts; (a part of Brimstone Mountain was torn away, and the old volcano belched out fire,) Nevis, Mount Serrat, etc.

, , February 8th., fearful earthquake at Guadaloupe, and the West Indian Islands.

, , February 12th., 11h. 30m. p.m., smart shock at Birmingham.

, , March 19th., 10 p.m., smart shock at St. Sebastian, Spain.

, , March 28th., violent shock at Smyrna.

, , April 1st., 5 p.m., smart shock at Kingston, in Jamaica.

, , April 13th., shock at San Salvador.

, , April 16th., a fearful earthquake at San Salvador, two hundred persons killed.

, , July 30th., for ten days shocks at intervals in the Pyrenees.

, , September 16th., at Wexford, great rush of waves in sea, several times.

1854. December 23rd., Japan, city of Ohosaca in ruins by earthquake.
, , December 29th., 3 a.m., violent shock at Nice.
1855. January 23rd., at Wellington and New Plymouth, in New Zealand, earthquakes.
, , February 28th., violent at Broussa, and less so at Constantinople.
, , April 10th., 8 p.m., several violent shocks at Broussa.
, , April 11th., violent shocks at Broussa.

(To be continued.)

HISTORY OF THE THUNDER-STORMS WHICH HAVE OCCURRED AT THE HIGHFIELD HOUSE OBSERVATORY FROM JANUARY, 1841, TO JANUARY, 1856.

BY THE EDITOR.

(Continued from page 114.)

1843. January 5th., in morning hail, snow, sleet.
, , January 10th., in evening snow-storm, vivid lightning in W and NW from 6 p.m. till 9h.
, , January 13th., 6 p.m. vivid lightning; great gale from S, barometer very low.
, , January 31st., 10h. 15m. p.m., flash of lightning in E.
, , February 17th., in afternoon heavy hail and snow-storm.
, , February 19th., in afternoon hail, snow, and rain.
, , April 7th., all day heavy showers of hail and rain.
, , April 8th., in afternoon heavy showers of hail and rain.
, , April 23rd., in morning loud thunder, at 1h. 30m. p.m. for thirty minutes heavy rain.
, , April 29th., 11 a.m., distant thunder in E.
, , May 4th., thunder-storm with heavy rain; 10 p.m. lightning in W.
, , May 6th., 10h. 30m. p.m., constant lightning in S, during the continuance of fine Aurora Borealis.
, , May 15th., after rainy day at 5 p.m. heavy thunder-storm; 5h. 20m. rain commenced after a brisk breeze from W had sprung up; wind had been E, storm came in W current, thunder till 6 p.m.
, , May 21st., thunder-storms; 3h. 35m. p.m., very black in S, E, and SW, constant thunder; 3h. 45m., lightning in E and NE, and SE thunder in fifteen seconds, no rain; storms moved in SSE current; the thunder had a curious rustling sound.
‘ ‘ May 22nd., 11 a.m. distant thunder.
, , May 24th., violent storm commenced at noon, tremendous rain and vivid lightning, rain rather abated at 1 p.m. for a short time, storm over at 2h.; in evening constant lightning all round horizon.
‘ ‘ May 25th., showers in the morning, with distant thunder in SW.

1843. May 26th., heavy showers in afternoon, distant thunder at sunset.

,, May 27th., heavy storm from S in the morning; 1 p.m. loud thunder and heavy rain.

,, May 28th., from 9h. till 11 a.m., heavy hail and rain.

,, June 3rd., very heavy thunder-showers all day; 7 p.m., storm in S, which moved to E; at 7h. 30m. much thunder and lightning from W to N from a storm which sunk in NNW.

,, June 8th., 1h. 15m. p.m. cloudless except small cloud on S horizon, wind S and brisk; 2h. 2m. heavy rain, lightning, with thunder in seven seconds; 2h. 5m. rain and hail in torrents, wind violent, branches torn off trees, wind most violent at 2h. 15m.; 4h. 18m. no abatement in fall of rain, and wind high.

,, July 5th., 3h. 30m. p.m. distant thunder in S incessant; 3h. 43m. lightning in SW, 4h. 2m. storm overhead, lightning constant, and thunder rolling for three minutes, wind S, rain; 4h. 5m. wind SSW, 4h. 10m. rain in torrents, nearest flash followed instantaneously by thunder, after which a strong sulphurous smell; storm violent till 4h. 25m. with much thunder and lightning, violent wind and rain; storm moved in SW current. 4h. 30m. thunder in NE, and from another storm in S.

,, July 7th., heavy storms all day, 3 p.m. one moved from S to NE, passing over us, with hail and rain, and frequent thunder.

,, July 9th., frequent storms all day.

,, July 13th., heavy storm from 2h. till 7 p.m.

,, July 31st., storm moved in NW current, much thunder.

,, August 3rd., heavy storms; one passed in NW at 10h. 45m. a.m., another from W to N at noon, 12h. 44m. p.m. thunder loud in W, NW, and N, 12h. 56m. thunder from a storm in SE, 1h. 4m. heavy rain, wind SW, 5 p.m. a storm passed in SE, thunder frequent in S and SE till 6 p.m.

,, August 9th., air very close, and dark, with incessant loud thunder; 7h. 40m. a.m. heavy rain, wind SSW, lightning vivid; mostly three miles SE of this place, thunder distant also in W; 8h. 15m., after a flash, a thunder peel with a curious crackling noise, temperature fallen from 63.5° to 61°, storms all round, nearest in E, (two miles off;) 9h. 51m. very heavy rain, wind SE, nearly calm; 10h. 1m. brisk breeze, from 10h. 4m. not a breath of air, and not a cessation in the rolls of thunder, very hazy; 10h. 36m. a brisk breeze from NNE, 10h. 39m. NE violent, 10h. 44m. SE by E very violent, dark and hazy, still violent rain; 10h. 47m. lightning in SE only 1140 yards off; 11h. 15m. a sudden abatement in the wind's force; 11h. 20m. calm, temperature 60.5°, principal storm in S; 1 p.m. still very dark, tremendous rain and continuous thunder; 1h. 14m. temperature 64°, 2h. 14m. breeze from W, 3h. sun shone for four minutes; 5h. heavy storm passed in SSE, and another in

> E, incessant thunder and lightning; 6h. 54m. a storm approached from W, three miles off; 7h. 13m. four flashes at the same moment, the nearest 1500 yards off, 7h. 17m. a flash within 760 yards, constant lightning. After 7h. 35m. no near flashes, yet thunder frequent all night, and till 6h. 15m. a.m. of the 10th. During the whole of the night the lightning was so incessant in every direction as to give the appearance of a tremendous fire all round the horizon, and more especially in SE. This storm lasted longer than any other that I have ever observed: colour of the lightning mostly pale yellow, occasionally red.

Of this storm I have the following accounts:

Welbeck Abbey, Nottinghamshire—His Grace the Duke of Portland, storms with heavy rain all day.

Southwell—Dr. Calvert, storms all day.

Boston—S. Veall, Esq., thunder, lightning, and rain from 11 a.m. till 10 p.m.

Ludlow—Mr. J. Marston, distant thunder.

Leicester—C. D. Ross, Esq., 7h. 45m. a.m. lightning and thunder with heavy rain commenced, and lasted till 8 p.m., 2¼ inches of rain fell.

Empingham—W. Fancourt, Esq., storm from 5 a.m. till midnight.

Hereford—J. Pendergrass, Esq., storm from 4h. 45m. a.m. till 11 a.m.

Worcester—J. Williams, Esq., storm from 5h. 30m. a.m.

Birmingham—Dr. Ick, heavy thunder showers all day.

Northampton—W. Grey, Esq., 6 a.m. till 1 p.m. storm, 8 p.m. till midnight another storm.

Little Barford, Huntingdonshire—Rev. J. Arlington, storms to S of this place.

Cambridge Observatory—John Glaisher, Esq., 2 p.m. thunder in NW; 3 p.m. lightning, storm coming in a nearly E direction, lightning brilliant purple colour; 4h. 45m. hail-stones measuring an inch in diameter lasted twenty minutes, causing immense damage; lightning all evening.

Dickleburg, Norfolk—F. Dix, Esq., in evening in NW, great destruction by hail-storms ten miles to NW.

Thwaite, Suffolk—O. Whistlecraft, Esq., from 4 p.m. continual thunder and much lightning, hail and rain at night.

Pilston, Monmouth—A. Purchas, Esq., tremendous storm from 2 a.m.

Painswick, Gloucestershire—Lieut. R. J. Morrison, severe storms from 4 a.m. till sunset.

Cirencester—R. J. Brown, Esq., violent storm.

Observatory, Oxford—M. J. Johnson, Esq., storm from 2h. 30m. p.m. till 7h. 30m.

Aylesbury—T. Dell, Esq., tremendous storm from noon till 5 p.m., (five miles to the S not a drop of rain.

High Wycombe—J. G. Tatem, Esq., distant thunder and lightning in evening.

Redbourn, Hertfordshire—W. B. Burnham, Esq., lightning and distant thunder.

Dunmow—A. Barfield, Esq., much lightning at 6 p.m.

Saffron Walden—T. Spurgin, Esq., from 8 p.m. thunder and lightning.

Chelmsford, Essex—Mr. C. Pigg, 9h. 15m. p.m. till half an hour past midnight, violent thunder and lightning.

Royal Observatory, Greenwich—G. B. Airy, Esq., midnight lightning.

Uckfield—C. L. Prince, Esq., 9 till 11 p.m. vivid lightning.

South Lambeth—J. H. Maverly, Esq., from 9 p.m. till 1 a.m. of 10th. vivid lightning; Cheltenham, Chatham, Rochester, Stroud, Norwich, etc., visited with an awful hail-storm.

Abingdon—A. Murdock, Esq., thunder in the morning, thunder and lightning in evening.

Chiswick—Mr. R. Thompson, lightning all night.

Newbury—Rev. W. Sheppard, 3 p.m. thunder; with heavy rain from 5h. 30m.; storm violent at Kintbury, then moved in N direction to Elcot, then NE direction to Boxford, crossing the downs in NW direction; ice three inches in circumference at Wantage. Here storm divided, the violent part going to Abingdon and into Oxford, the other towards Wallingford.

Alton, Hampshire—W. Curtis, Jun., Esq., 7 p.m. distant thunder in N.

Corfe Castle—W. Voss, Esq., noon thunder.

Bath—Rev. C. Blathwaite, 6 p.m. thunder.

Warminster—H. Robertson, Esq., 3 p.m. storm came from NW, and at 4h. 45m. another—very heavy, much thunder and lightning.

The storm was first traced in Monmouthshire, passing through Worcestershire, Herefordshire, Warwickshire, and Leicestershire, then dividing, one portion moving across Rutland to Lincolnshire, another over Nottinghamshire and Derbyshire, into Yorkshire, and a third branch to Northamptonshire and Buckinghamshire. At 3 p.m. a storm commenced in Wiltshire, which passed over Berkshire, into Oxfordshire, part of Northamptonshire, through Huntingdonshire, to Cambridgeshire, and into Norfolk and Suffolk. At 6 p.m. a storm in Somersetshire passed into Gloucestershire.

1843. August 10th., thunder till 6h. 15m. a.m.

,, August 13th., 9 p.m. lightning.

,, August 14th., vivid lightning in NW in evening.

,, August 15th., all day occasional thunder in E and SW. At night constant lightning from all parts of the compass.

,, August 16th., from 5h. till 6 p.m. constant thunder from storm which moved from S to W.

,, August 19th., constant distant lightning in W at night.

,, September 10th., 8 p.m. lightning in S.

,, September 17th., 5 p.m. storm in S, constant lightning at night in N.

,, October 17th., in morning rain and snow; 1 p.m. till 1h. 20m. loud thunder, first in W, then in NW. At 2 a.m., October 18th., heavy fall of snow.

,, October 26th., in evening vivid lightning in SSE.

,, November 8th.,1 2h. 30m. p.m. and 1h. 45m. heavy hail-storms.

,, November 18th., 7h. till 11 p.m. much lightning in NW. In the evening Aurora Borealis, and at 11h. 20m. a large meteor.

,, November 19th., lightning at night; barometer fell nearly an inch, from midnight a heavy gale from SW, with lightning, especially at 2 a.m. of 20th.

,, December 23rd., 7 p.m. lightning in SE.

,, December 27th., 11 p.m. lightning in SE.

ADDITIONAL REMARKS.

Epoch. 1843.	Gt. Heat day after.	Min. Temp. Deg.	Max. Temp. Deg.	Mean Pressure. Inches.	Wind.
Jan. 5	..	31.0	37	30.0 R.	NW.
“ 10	..	29.0	35.5	28.6 R.	W.
“ 13	..			28.0 F.	S.
“ 31	..	38	50	29.7 S.	W.
Feb. 17	..	19	37	29.4 R.	N.
“ 19	..	29	37	29.3 F.	E.
April 7	..	46	61	29.2 F.	W.
“ 8	..	37	61.5	29.4 R.	NW.
“ 23	..	39	55	30.0 R.	S, had been E.
“ 29	..	36	50	29.6 R.	E, became S, & again E.
May 4	..	44	64	29.7 F.	S.
“ 6	..			29.4 R.	W.
“ 15	..	47	65	29.4 F.	SW, before E, after W.
“ 21	..	43	66	29.5 F.	SE, after S.
“ 22	..	44	67.5	29.6 R.	SW, before S, after NE.
“ 24	..	46	60.5	29.4 F.	E, after W.
“ 25	..	46.5	67	29.5 R.	W.
“ 26	..	46.5	65.5	29.5 F.	SW, after S.
“ 27	..	48	60.5	29.3 R.	S.
“ 28	..	43	60.5	29.5 R.	N, after S.
June 3	..	44	64	29 4 R.	S.
“ 8	..	40	60	28.8 F.	S.
July 5	..	56	77	29.6 F.	SE, after SW.
“ 7	..	48	73	29.8 R.	W.
“ 9	..	48	71	30.0 R.	NE, bef. SSW, after E.
“ 13	..	46	66	30.2 R.	E, after NE.
“ 31	..	50	71.5	29 8 R.	W.
Aug. 3	..			29.3 R.	S.
“ 9	..			30.1 F.	
“ 10	..	45.7	74.5	30.2 R.	N.
“ 13	..	49	74.5	30.2 F.	E.
“ 14	..	50.5	75.5	30.0 F.	E.
“ 15	..	50	76.5	30.0 F.	E.
“ 16	..	55	77.5	30.1 R.	E.
“ 19	..	53	85.5	29.8 F.	E, after W.
Sept. 10	..	54	76	30.0 F.	S, before E, after NE.
“ 17	..	47	77	30.2 R.	S, before and after E.
Oct. 17	..	28	39	29.2 R.	N.
“ 26	55	39	54	29.4 R.	N, before and after W.
Nov. 8	..	38	49	29.7 R.	NW.
“ 18	..	31.5	45.5	30.4 F.	W, before NW.
“ 19	..	32	44.5	29.5 F.	W.
“ 20	..	36	47	29.0 F.	S.
Dec. 23	..	45	55.5	30.5 R.	W.
“ 27	..	45	47.5	30.7 R.	SW.

(To be continued.)

CALENDAR OF NATURE FOR NOVEMBER, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY, NEAR NOTTINGHAM.

BY THE EDITOR.

November is usually a barren month, as regards these records.

6th.—A Woodcock, (*Scolopax rusticola,*) was shot; since which date there have been more of these birds in the neighbourhood than usual.

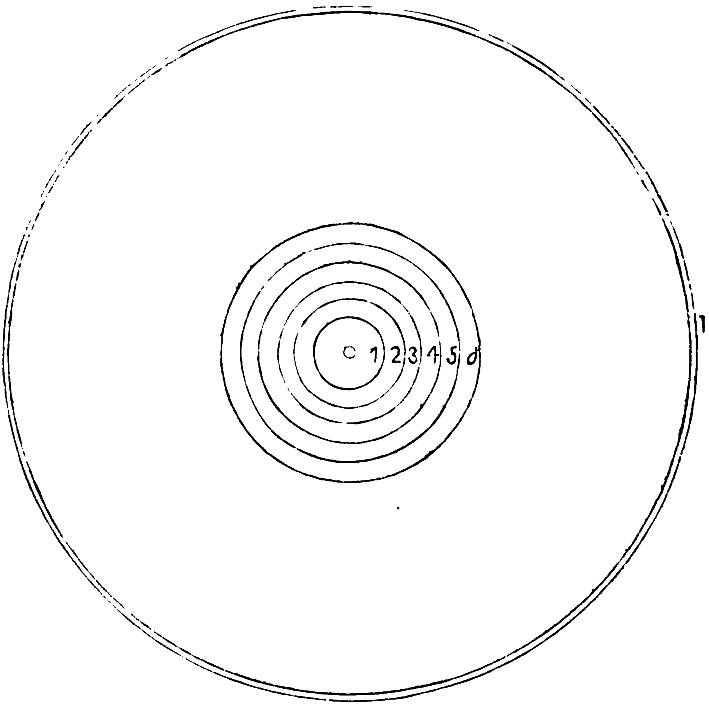
7th.—The Tree Slug, (*Limax arborum,*) was observed in abundance.

8th.—Many Mushrooms and Fungi.

11th.—Vast numbers of Caterpillars on the cabbage.

27th.—Swarms of small White Moths in the evening.

SPLENDID LUNAR CORONÆ AND HALO SEEN AT THE BEESTON OBSERVATORY, ON 25th. OCTOBER, 1855.



The accompanying is a sketch of splendid Lunar Coronæ, which lasted from 12h. 5m. a.m. until 12h. 30m. Brightest at 12h. 23m. In the drawing the moon is in the centre. No. 1 was pure snowy white, 1½° in width. No. 2, yellowish, 45′ wide. No. 3, blue, 45′ wide. No. 4, pale pink, 45′ wide. No. 5, pale blue, 45′ wide. No. 6, pale yellow, 45′ wide. No. 7, a Lunar Halo of 23° radius. A gale was occurring at the time. The Coronæ were at a much lower elevation than the Halo, and were formed in fleecy cumuli; the Halo in a cirrostratus.

RAIN FALL IN NOVEMBER, 1855.

	Inches.
Manchester, G. V. Vernon, Esq., F.R.A.S.,	0.63
Rose Hill, Oxford, Rev. J. Slatter, F.R.A.S.,	0.71
Bromsgrove, G. Dipple, Esq.,	0.75
Observatory, Beeston,	0.83
Highfield House Observatory,	1.00
Lampeter, Cardiganshire, Rev. J. Matthews,	1.06
Bolton, H. H. Watson, Esq.,	1.08
Newport, Isle of Wight, J. C. Bloxam, Esq.,	1.98
Belvoir Castle, W. Ingram, Esq.,	2.12
Grantham, J. W. Jeans, Esq., F.R.A.S.,	2.12
St. Paul's Parsonage, Wigton, Rev. T. Redford,	2.18
Berkhampstead.,	2.47
Royston, H. Wortham, Esq.,	2.63
Boston, T. Collis, Esq.,	2.67
Uckfield, C. L. Prince, Esq.,	1.76

DIRECTION OF THE WIND,
AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN NOVEMBER, 1855.

1st.—NNW, 11 a.m. NW, 4 p.m. WNW.

2nd.—WNW, 8 a.m. NW, 9h. N, 10h. NNE, 1h. 30m. p.m. N, 2h. NNW, 9h. N.

3rd.—N, 4 a.m. NE, 6h. NNE, 8h. 15m. NE, 9h. E, 10h. NNE, 11h. 15m. NW, 11h. 30m. NE, 12h. 15m. p.m. E, 12h. 30m. ENE, 3h. NE, 4h. 45m. N.

4th.—N, 10h. 45m. a.m. NNE, 3 p.m. N, 4h. NNW, 5h. 30m. N, 8h. NNW.

5th.—NNW, 2h. 30m. a.m. NW, 6h. 30m. WNW, 9h. W, 10h. 45m, SW, 1 p.m. SSW, 9h. 15m. SW.

6th.—SW, 4 a.m. SSW, 8h. SW, 2 p.m. SSW.

7th.—SSW, 2 a.m. S.

8th.—S, 6 a.m. SW, 6h. 30m. S, 10h. 30m. SSW, 10h. 45m. SW, 12h. 45m. p.m. WSW, 1h. 15m. W, 2h. 30m. SW, 3h. 15m. S, 3h. 30m. SSW, 4h. SW, 5h. W, 5h. 15m. SW.

9th.—SW, 7 a.m. SSW, 10 h. S, 2 p.m. SSE, 5h. SE.

10th.—SE, 8h. 30m. a.m. SSE, 9h. S, 1h. 15m. p.m. SSW, 1h. 45m. SW, 2h. S, 7h. 30m. SSW, 10h. 45m. SW, 11h. 45m. WSW.

11th.—WSW, 3 a.m. SW, 8h. SSW, 10h. SW, 9h. 45m. p.m. SSW, 10h. SW.

12th.—SW, 3h. 15m. a.m. SSW, 4h. 15m. S, 5h. 15m. SSE, 6h. 45m. S by E, 8h. SSW.

13th.—SSW, 1h. 5m. a.m. SSE, 1h. 55m. E, 3h. 45m. p.m. NE, 3h. 50m. ENE, 5h. E.

14th.—E, 2h. 55m. a.m. ENE, 3h. 5m. NE, 4h. 5m. N, 4h. 45m, NE, 5h. 5m, E, 8h. 55m. N, 11h. 45m. NNW, 11h. 50m. NW, 12h. 15m. p.m. NNW, 1h. N, 1h. 30m. NNE, 2h. 35m. N by W, 3h. 20m. NNW, 3h. 30m. N by W.

15th.—N by W, 7h. 30m. a.m. NW, 7h. 45m. W, 8h. WSW.

16th.—WSW.

17th.—WSW, 9h. 35m. a.m. moved through W to N, 10h. 15m. NE, 7 p.m. ENE, 8h. 15m. NE, 8h. 45m. NNE.

18th.—NNE, 1 a.m. NE, 5h. NNE, 7h. 45m. NE, 8h. 15m NNE, 11h. NE, 11h. 15m. ENE, 12h. 30m. p.m. E, 2h. ENE, 4h. 45m. NE, 5h. 30m. NNE, 6h. 30m. NE.

19th.—NE.

20th.—NE.

21st.—NE.

22nd.—NE, 6 a.m. N, 8h. NW, noon NNW, 1 p.m. N.

23rd.—NE, 4 a.m. ENE, 6 p.m. NE.

24th.—NE.

25th.—NE, 1 a.m. NNE.

26th.—NNE, 10h. 30m. a.m. N, 11h. NE, 1h. 45m. p.m. NNE, 9h. 30m. N, 11h. 30m. NW.

27th.—NW, 5 a.m. NNW, 5h. 15m. N, 6h. 30m. NNE, 9h. NNW, 9h. 15m. N, 3h. 30m. p.m. N by E, 8h. 45m. N, 10h. N by E.

28th.—NNW, 12h. 45m. a.m. N, 1h. 30m. NNW, 4h. 30m. N, 6h. NNE, 2h. p.m. NE, 3h. 30m. NNE, 6h. 30m. N, 8h. N by W, 8h. 30m. NNE.

29th.—NNE, 12h. 30m. a.m. N by E, 1h. N, 1h. 15m. N by W, 5h. NNW, 6h. NW, noon WNW, 3h. 15m. p.m. NW.

30th.—NW, 5 a.m. WNW, 6h. 30m. p.m. NW.

FORCE OF THE WIND, AS WRITTEN BY THE ATMOSPHERIC RECORDER AT THE BEESTON OBSERVATORY, IN NOVEMBER, 1855.

1st.—3 to 7oz. till 4h. 30m. a.m., then 4 to 8oz., 6h. 4oz. to 1lb. 5oz., 11h. 3 to 8oz., 3 p.m. 4oz.

2nd.—4oz., 4h. 30m. p.m. 4 to 10oz., 6h. 45m. 3lb., 7h. 2lb., 7h. 30m. 1lb. 9oz., 8h. 2lb. 8oz.

3rd.—4lb., 12h. 10m. a.m. 2lb., 1h. 1lb. 12oz., 2h. 2lb. 12oz., 2h. 15m. 3lb., 3h. 2lb. 10oz., 4h. 45m. 2lb. 14oz., 5h. 10oz., 6h. 4oz., 8h. 1lb., 9h. 15m. 4oz., 10h. 15m. 1lb. 10oz., 10h. 20m. 5oz.. 11h. 30m. 1lb. 9oz., 11h. 40m. 5oz., 12h. 15m. p.m. (with hail) 2lb. 13oz., 12h. 30m. 6oz., 1h. 45. 1lb. 5oz., 2h. 45m. 4oz., 3h. 30m. 1lb. 7oz., 4h. 4oz., 7h. 1oz., 8h. calm.

4th.—1oz., 2h. 30m. a.m. 4oz., 4h. 3oz., 8h. 4oz., 10h. 11oz., 11h. 4oz., 3 p.m. 3oz., 6h. 2oz., 9h. calm.

5th.—Calm, 10h. 45m. a.m. 1oz., noon 3oz., 1h. p.m. 2oz., 5h. 30m. 3oz., 6h. 4oz.

6th.—4oz., 10h. a.m. 5oz., 11h. 30m. 8oz., noon 1lb. 5oz., 2 p.m. 1lb. 7oz. 4h. 30m. 5oz., 6h. 1lb., 7h. 1lb. 7oz., 8h. 15m. 10oz., 9h. 45m. 1lb. 3oz., 10h. 9oz., 10h. 45m. 1lb. 10oz., 11h. 15m. 1lb. 5oz.

7th.—1lb. 7oz., 2h. 30m. a.m. 4oz., 3h. 8oz., 4h. 45m. 1lb. 7oz., 5h. 30m. 1lb., 7h. 4oz., 7h. 30m. 8oz., 9h. 1lb. 2oz. to 1lb. 8oz., 1 p.m. 2lb., 3h. 1lb. 7oz., 7h. 5oz., 8h. 1lb. 7oz., 9h. 2lb., 10h. 3lb.

8th.—1lb. 12oz., 2 a.m. 1lb. 7oz., 4h. 30m. 8oz., 6h. 5oz., 5 p.m. 1lb. 14oz., 5h. 5m. 8oz., 5h. 15m. 5oz., 7h. 1oz.

9th.—1oz., 7 a.m. calm, noon 4oz., 1h. 8oz., 1h. 45m. 5oz., 3h. 4oz., 8h. calm.

10th.—Calm, 8h. 45m. a.m. 3oz., 9h. 2oz., noon 3oz., 6 p.m. 4oz., 8h. 6oz., 8h. 15m. 4oz.

11th.—1oz., 7 a.m. 4oz., 3 p.m. 3oz., 6h. 2oz., 10h. 1oz.. 11h. calm.

12th.—Calm.

13th.—Calm, 6h. 30m. p.m. 1oz., 6h. 45m. 2oz., 9h. 1oz,, 11h. calm.

14th.—Calm.

15th.—Calm.

16th.—Calm.

17th.—Calm.

18th.—Calm, 6h. 30m. p.m. 2oz., 7h. 4oz., 7h. 30m. 10oz., 8h. 4oz., 9h. 8oz., 9h. 30m. 4oz., 11h. 8oz.

19th.—1lb., 1 a.m. 4oz., 2h. 45m. 8oz., 3h. 45m. 1lb. 5oz., 10h. 4oz., 11h. 8oz., 5 p.m. 1lb.

20th.—4oz.

21st.—4oz., 10 a.m. 2 to 4oz., noon 4oz.

22nd.—2 to 4oz., noon 4oz.

23rd.—2 to 4oz., noon 4oz.

24th.—4oz. to 1lb. 7oz.

25th.—4oz. to 1lb., 6 a.m. 8oz., 7h. 4oz., 10h. 1lb. 7oz., noon 1lb. 5oz., 1h. 30m. p.m. 4oz., 2h. 8oz., 2h. 30m. 4oz., 7h. 3oz., 10h. 2oz.

26th.—2oz., 9 a.m. 1oz., 11h. 4oz., 1 p.m. 2oz., 4h. 1oz., 6h. calm.

27th.—Calm, 11h. 30m. a.m. 4oz., noon 3oz., 4 p.m. 1oz.

28th.—Calm, 5h. 30m. a.m. 2oz., 6h. 4oz., 10h. 30m. 8oz., 10h. 45m. 5oz., 11h. 10oz., 11h. 5m. 1lb. 5oz., 11h. 10m. 10oz. 12h. 30m. p.m. 4oz., 2h. 1lb. 7oz., 2h. 5m 8oz., 3h. 4oz., 4h. 3oz., 5h. 2oz., 7h. 1oz., 9h. calm.

29th.—Calm, 3h. 15m. p.m. 4oz., 3h. 45m. 2oz., 5h. 1oz., 6h. 45m. 2oz., 7h. 1oz., 9h. calm.

30th.—Calm, 2 a.m. 1oz., 10h. 4oz., 11h. 30m. 3oz., 12h. 30m. p.m. 4oz., 1h. 6oz., 1h. 3m. 4oz., 2h. 30m. 3oz., 4h. 2oz., 7h. 1oz., 9h. calm.

ELECTRICITY AT THE BEESTON OBSERVATORY, DURING NOVEMBER, 1855.

Electricity feeble, except on the 3rd., at 12h. 30m. p.m., during a hail-storm, and on the 8th. at 5 p.m., with a thunder-storm, passing to NW of this place. From the 1st. to the 26th. it was positive, except during the hail-storm on the 3rd., when it struck sides of electrometer, and became negative for a short time. It was negative from 26th. to the end of the month, except on the morning of the 29th. There was no trace of electricity on the evenings of the 27th. and 29th., and mornings of the 28th. and 30th. The storm on the 8th. moved in a W current; at 4h. 20m. p.m., a loud peal of thunder, after which several distant peals. For ten minutes there was heavy rain and boisterous wind.

STATE OF THE WEATHER IN NOVEMBER, 1855, AT THE HIGHFIELD HOUSE OBSERVATORY.

1st., fine. 2nd., 6 a.m. till 7h., rain and snow, then fine, scarlet sunset; from 5h. 30m. p.m., gale, with showers. 3rd., gale, with showers, thunder clouds; 12h. 30m. p.m., heavy hail, 3h., a shower, evening very fine. 4th., from 10 a.m., rain, 10h. 30m., fair, after 1h. 15m. p.m., fine. 5th., dull. 6th., rain in the night, dull. 7th., dull. 8th., dull, 11h. 30m. a.m. till 2 p.m. rain, 4h. a thunder-storm passed in NW, 4h. 20m. loud thunder. 9th., very fine. 10th., fine. 11th., very fine. 12th., dull. 13th., dull. 14th., dull. 15th., dense fog. 16th., exceedingly dense fog. 17th., dense fog, after 10 a.m. hazy, from 9 p.m. rain. 18th., damp and hazy. 19th., dull. 20th., fair. 21st., rain. 22nd., fair. 23rd., rain. 24th., showers. 25th., fine. 26th., a mist came on at 9 p.m. for an hour, then fine. 27th., fine. 28th., fine, with two showers. 29th., fine. 30th., very fine.

RESULT OF OBSERVATIONS MADE AT HIGHFIELD HOUSE OBSERVATORY, IN NOVEMBER, 1855.

THERMOMETER.

Mean of November from 1809 to 1852, 42.9°; and from 1847 to 1854, 41.3°.

Mean of November from 1810 to 1820, 42.5°; and from 1820 to 1830, 43.6°.

Mean of November from 1830 to 1840, 42.2° ;and from 1840 to 1850, 43.2°.

Diurnal range, 31.5°. Mean dry bulb, corrected for diurnal range, 41.5°. Mean of the greatest heat and greatest cold of each day, corrected for diurnal range, 41.1°; excess or defect of adopted mean in 1855 from that of the past eight years, + 0.2°, and of the last forty years, – 1.8°. Greatest heat in sunshine, 73.8°; greatest amount of solar radiation, 26.9°; of terrestrial radiation, 6.8°.

BAROMETER.

Mean from 1847 to 1854, 29.736 inches; excess or defect in 1855 from the mean, 0.131 of an inch; range in November, 1855, 0.829 inch. Mean pressure of dry air, or that of the gases, 29.623 inches; elastic force of vapour, or mean pressure of the water contained in the air, 0.244 of an inch.

HYGROMETICAL OBSERVATIONS.

Mean temperature of dew point, 37.8°; mean of November, between 1847 and 1854, 38.6°; excess or defect in November, 1855, – 0.8°; mean temperature of wet bulb, corrected for diurnal range, 39.8°; mean temperature of evaporation, 39.1°. Mean weight of vapour in a cubic foot of air, 2.8 grains; average between 1848 and 1854, 2.8 grains; excess or defect in 1855, November, ± 0°; additional weight of vapour required to saturate a cubic foot of air, 0.4 of a grain; average between 1848 and 1854, 0.4 of a grain; excess or defect in 1855, November, ± 0 of a grain. Degree of humidity, (complete saturation being 1.000,) 0.880; average from 1848 to 1854, 0.874; excess or defect in 1855, – 0.006. Mean weight of a cubic foot of air, 548.0 grains; average between

1848 and 1855, 545 grains; excess or defect in 1855, November, — 3 grains. Whole amount of water in a vertical column of the atmosphere, 3.4 inches; average of last four years, 3.4 inches; excess or defect in 1855, November, ± 0 inch.

OZONE.

Mean amount, 3.1; number of nights without ozone, 0; number of days without ozone, 15. Mean with wind W, 4.7; NW, 3.5; N, 4.1; NE, 1.7; E, 2.2; SE, 2.3; S, 3.4; SW, 3.7.

Rain; amount at two feet from the ground, 1.002 inches; excess or defect in 1855, — 1.5 inches; average fall in November for past eleven years, 2.5 inches. Average amount of evaporation from 1848 to 1854, 1.1 inches; excess or defect in November, 1855, + 0.4 inch. Mean amount of cloud, 8.7.

METEOROLOGICAL TABLE FOR OCTOBER, 1855, FROM THE HIGHFIELD HOUSE OBSERVATORY, NOTTINGHAM.

Date.	Mean Pres. of Barom. (181 feet.)	Temperature of the Air.					Ozone.		Amount of Rain. at 25 feet.	Amount of Evap.	Temp. of Evap.
		Highest	Lowest.	Range.	Lwst on Grass.	Adptd. Mean.	In the night.	In the day.			
	In.	Deg.	Deg.	Deg.	Deg.	Deg.	0—10	0—10	In.	In.	Deg.
1	29.576	43.0	29.8	13.2	30.1	35.5	8	0		0.042	31.9
2	.573	46.8	29.9	16.9	27.8	40.4	4	6½	.170	.050	37.9
3	.782	46.9	35.8	11.1	37.6	40.6	9	0	.120	.040	37.9
4	.986	48.0	38.0	10.0	35.0	43.1	7½	8	.005	.023	41.0
5	.994	48.0	36.4	11.6	33.0	42.5	1½	0		.022	40.7
6	.805	54.2	44.6	9.6	41.3	49.7	7	6½	.068	.023	47.3
7	.510	53 5	48.5	5.0	45.2	50.9	10	0	.005	.047	47 6
8	.372	49.6	38.8	10.8	44.0	44.1	4	6	.241	.040	42.0
9	.620	53.7	33.0	20.7	29.5	41.9	5	0	.010	.035	41.0
10	.749	54.6	42.5	12.1	39.4	49.2	2	0		.030	47.7
11	30.026	51.4	35.8	15.6	30.0	43.6	5	6		.018	42.2
12	.039	49.8	43.3	6.5	39.4	46.3	5	0		.022	44.5
13	29.909	45.3	40.0	5.3	42.1	42.9	3	2½		.020	40.7
14	.844	45.5	39.2	6.3	37.9	41.4	3	0		.028	39.7
15	.986	40.2	24.6	15.6	27.9	30.3	2	1		froze	29.8
16	30.134	37.2	23.1	14.1	22.8	29.3	3	0		id.	28.0
17	.135	45.0	25.7	19.3	23.6	36.2	1	0		id.	35.1
18	.093	47.1	39.3	7.8	32.5	44.3	1	2	.040	.038	43.0
19	.003	47.2	40.1	7.1	40.5	43.1	5	3	.029	.024	41.3
20	29.893	43.4	38.4	5.0	38.9	40.9	4	0		.016	37.7
21	.772	41.2	37.5	3.7	37.5	39.6	2	0	.014	.028	37.0
22	.630	41.8	36.5	5.3	35.7	39.4	6	1	.107	.012	38.8
23	.651	40.3	34.0	6.3	30.8	37.9	2	0	.097	.008	36.8
24	.846	42.0	36.8	5.2	36.5	39.6	7	3	.053	.012	37.9
25	30.133	44.6	34.0	10.6	32.6	38.0	10	5½		.013	36.1
26	.176	43.1	31.4	11.7	27 6	37.0	4	0		froze	34.9
27	29.950	45.9	36.2	9.7	34.0	42.9	1	0		.056	40.0
28	30.021	46.1	39.5	6.6	40.2	42.9	5½	2		.030	42.0
29	29.958	44.5	37.5	7.0	38.5	41.0	6	2		.038	37.1
30	.847	45.6	33.7	11.9	32.5	37.7	1	1½		.034	36.0
Mean	29.867	46.2	36.1	10.1	34.8	41.1	4.5	1.8	0.958	0.749	39.2
Max.	30.268	54.6	48.5	20.7	45.2	50.9	10	8	0.241	0.050	47.7
Min.	29.439	37.2	23.1	3.7	22.8	29.3	1	0		0.008	28.0